printed by
Bournemouth Guardian Limited
SPRING ROAD · BOURNEMOUTH

S.18.15.

PROCEEDINGS

OF THE

Bournemouth Natural Science Society

VOL. LIV

SESSION 1963-64

Price - Five Shillings

BRITISH MUSEUM
10 FEB 1965
NATURAL HISTORY

PROCEEDINGS of the

Bournemouth Natural Science Society

VOL. LIV.

SESSION 1963-64

PUBLISHED BY THE SOCIETY AT ITS HOUSE,
39 CHRISTCHURCH ROAD, BOURNEMOUTH, 1965

Contents

	Page
Introductory Note	3
Officers and Council, 1964-65	4
Committees, 1964-65	5
List of Members (7th December, 1964)	6
List of Presidents—1903-1965	15
Summary of Accounts for Year ending 30th September, 1964 ...	16
Council's Report for Year ending 30th September, 1964	20
Obituary Notices:—	
Mrs. Eva Mary Haines	22
Henry Arthur Hayward	23
Harold Clement Mayo	23
Section Reports for the Year 1963-64:—	
Library	24
Museum	24
Garden	24
Archaeology and History	24
Astronomy	26
Botany	26
Geography	27
Geology	28
Microscopy	29
Photography	29
Physics and Chemistry	30
Zoology	31
Cine Film Subscription Programmes	32
Club Days	32
Presidential Address for the Year:—	
"Nonconformity in Nature"	
by Dame Kathleen Lonsdale, D.B.E., D.Sc., F.R.S.	34

Introductory Note

The objects of the Society are declared in the second of its Rules to be "the promotion of the study of Science in all its branches, and of Public Education, by means of Lectures, Field Meetings, the reading and discussion of Papers, and in any way that the Council of the Society shall deem advisable".

The branches of Science at present represented are as follows:— **Archaeology and History, Astronomy, Botany, Entomology, Geography, Geology, Microscopy, Photography, Physics and Chemistry, Zoology.**

During the Winter Session, from October to April, lectures on matters of scientific interest are held on two or three days a week. These are usually illustrated by slides, films, episcope pictures, specimens, diagrams, experiments, etc.

Throughout the Summer Session, from April to September, Excursions or Field Meetings are arranged on two or three days every week, when parties of members visit places of scientific interest under the guidance of section chairmen and other specialists, sometimes in or near Bournemouth, at other times farther afield by coach or train.

The Society possesses a Library from which books may be borrowed by members, and there is a Reading Room where works of reference may be consulted. The Museum contains many valuable scientific collections and specimens. The Library and the Museum serve to illustrate and illuminate the ten Sections of the Society. There is a well-equipped Dark Room for the use of members interested in photography. The house stands in a pleasant garden of over an acre.

The management of the Society is vested in a Council, which is elected at the Annual General Meeting. Members are elected by the Council. An Entrance Fee of 5/- is payable upon nomination for election. The Annual Subscription for Town Members is 30/- (Life Membership: £15). The Family Subscription (for members of a family living in the same house) is as follows:— first adult member, 30/-; second adult member, 20/-; each additional adult member, 10/-; children between 12 and 18 years (Associate Members), 5/- each. **Town Membership is confined to those who are resident within the Municipal, Urban District and Parish Boundaries listed below:—**

HAMPSHIRE: Bournemouth County Borough, Hurn, Sopley, Christchurch Municipal Borough, Christchurch East.

DORSET: Poole Municipal Borough, Wimborne Urban District, Hampreston, West Moors, West Parley.

Members, other than Associate Members, living outside the areas listed above, shall pay half the above rates of subscription.

A bi-monthly Programme giving full details of all meetings is posted to every member. A volume of Proceedings is published annually; adult members receive a copy.

Application Forms for Membership and further particulars may be obtained from the Honorary Assistant Secretary, Miss M. Hipperson, B.N.S.S., 39 Christchurch Road.

Bournemouth Natural Science Society

OFFICERS AND COUNCIL FOR 1964-65

N.B.—University degrees and other qualifications are inserted only at the first mention of names.

President
DAME KATHLEEN LONSDALE, D.B.E., D.SC., F.R.S.

Chairman of Council
MISS D. M. LOWTHER, B.SC.

Deputy Chairman of Council
F. W. MOSS

Council
THE OFFICERS AND CHAIRMEN OF SECTIONS *(ex-officio)*

J. H. BAILEY
T. H. BICKEL
MISS C. M. BRAIN
E. CHAMBERS, F.L.S.
MRS. W. CHOME
M. H. COCKE
W. S. I. COX, F.R.E.S.
D. J. DUDLEY
G. HOLROYD
J. C. MITTON, A.C.A.
W. MOORE
W. E. PAGE, M.A.
MISS M. A. M. PENROSE, B.SC.
P. J. PIPER, F.R.I.C.S.
W. J. READ, M.SC., F.R.I.C.
G. A. SHILLIDY, C.I.E.
MRS. B. TAYLOR
MRS. W. BOYD WATT, F.Z.S., M.B.O.U.
MISS E. M. WHITAKER
MRS. M. P. YULE

Chairmen of Sections

Archaeology and History: MRS. C. SIMPSON
Astronomy: W. P. WINTER, B.SC.
Botany: MRS. A. K. HUNT, B.SC.
Entomology:
Geography: MISS F. M. EXTON, B.A.
Geology: D. A. WRAY, PH.D., M.SC., F.G.S.
Microscopy: A. J. AIERS, M.I.Mech.E., M.I.P.E.
Photography: MISS U. M. OGLE
Physics and Chemistry: H. E. CLARKE, M.A., B.SC., F.R.I.C.
Zoology: H. V. HARRIS

Hon. Treasurer
F. J. WOOD

Hon. Assistant Treasurer: A. E. WITHERS, F.A.I.

Hon. Secretary:
G. A. SLATER

Hon. Assistant Secretary: MISS N. HIPPERSON
Hon. Programme Secretary: A. CHARTER

Hon. Librarian
H. S. HOLBROOK, B.SC., M.I.E.E., F.A.I.E.E.

Hon. Curator
MRS. N. SEPHTON, M.B., CH.B.

Hon Slides Custodian
J. C. MITTON, A.C.A.

Hon. Editor
D. T. ADAMS, M.A.

Hon. Auditors
A. V. LAWES AND A. H. MIDDLEMAST

Hon. Architect
A. J. BUTCHER, F.R.I.B.A.

Hon. Solicitor
G. A. TURNER

Bankers
NATIONAL PROVINCIAL BANK LTD., THE SQUARE, BOURNEMOUTH

COMMITTEES, 1964-65

Finance and General Purposes:
Chairman: MISS D. M. LOWTHER
Hon. Treasurer: F. J. WOOD *Hon. Secretary:* G. A. SLATER
E. CHAMBERS, H. E. CLARKE, H. V. HARRIS, MISS M. HIPPERSON,
F. W. MOSS, P. J. PIPER, G. A. SHILLIDY, A. E. WITHERS, D. A. WRAY

Library:
Chairman: J. H. BAILEY
D. T. ADAMS, H. E. CLARKE, M. H. COCKE, H. S. HOLBROOK,
MRS. M. D. SELFE, MRS. A. W. WHITE

Museum:
Chairman: MRS. N. SEPHTON
CHAIRMEN OF SECTIONS AND CHAIRMAN OF HOUSE COMMITTEE (*ex-officio*)

House:
Chairman: G. A. SHILLIDY
W. E. PAGE, P. J. PIPER, MRS. D. E. WITHERS

Garden:
Chairman: MRS. W. CHOME
E. CHAMBERS, MRS. A. K. HUNT, MISS E. M. WHITAKER

Projection:
Official Projectionists: G. HOLROYD (*Still*), D. J. DUDLEY (*Ciné*)
J. C. MITTON, W. MOORE, MRS. I. SEWELL

Tea:
Chairman: MISS E. M. WHITAKER
Deputy Chairman: MRS. A. A. BAILEY
MISS BALFOUR-BROWN, MRS. GANDY, MRS. HARRIS, MRS. LE SUEUR,
MRS. LOGIE, MRS. MIDDLEMAST, MRS. POWIS, MISS ROWE, MISS SAUNDERS,
MRS. TAYLOR, MISS WHITE, MRS. WITHERS, MRS. WYCHERLEY

Entertainment:
Chairman: MRS. I. M. SIMMONS
MISS G. GREEN, G. HOLROYD, J. C. MITTON, F. W. MOSS,
MRS. R. B. SUNDERLAND, MISS F. H. WARDEN, W. P. WINTER

Bournemouth Natural Science Society

List of Members

Revised to 7th December, 1964

*HONORARY MEMBER
vVICE-PRESIDENT
†PAST PRESIDENT
wGILBERT WHITE FELLOWSHIP
lLIFE MEMBER
oORIGINAL MEMBER
aASSOCIATE MEMBER

The year of election is given before the name of each member

1964	Acheson, The Hon. Mrs. N.	Pinewood Edge, Ettrick Road, Branksome Park
1961	Adams, D. T., M.A.	13 Sandy Mead Road, Queen's Park
1961	Adams, Mrs. M.	" "
1955	Adams, Mrs. K. L.	1 Gleneagles Avenue, Parkstone
1963	Adams, Mrs. M.	46 Mag's Barrow, Ferndown, Dorset
1958	Agar, R., A.M.I.C.E.	84 Howard Road
1958	Aiers, A. J., M.I.Mech.E.	Maasdam, Golf Links Road, Ferndown
1958	Aiers, Mrs. F.	" "
1961	Aiers, Miss E. M.	Flat 2, Earlston, 8 Portarlington Road
1962	Allen, Mrs. A. W. S.	80 Bath Hill Court
1958	Allen, Mrs. F. C.	8 Twynham Road, Southbourne
1963	Allen, Miss M.	174 Holdenhurst Road
1960	Alsford, C.	Long Field, Church Road, Ferndown
1960	Alsford, Mrs. J. R.	" "
1956	Ambler, Lieut. Col. M. J.	Min's Cottage, 5a Branksome Wood Road
1955	Ambler, Mrs. A.	" "
1963	Antill, H. E.	3 Belgrave Road, Branksome Park, Poole
1963	Antill, Mrs. M. B. R.	" "
1963	Archer, Mrs. H. M.	4 Barclay Mansions, St. Valerie Road
1963	Ashburner, Mrs. Y.	Fernmount, New Milton
1952	lAtkinson, Mrs. A., S.R.N.	40 Palmer Road, Oakdale, Poole
1964	Bailey, C. T.	9 Warren Edge Road, Southbourne
1955	Bailey, Miss F. E. L.	57 St. Catherine's Road, Southbourne
1955	Bailey, Miss G. L.	" "
1950	Bailey, J. H.	39 Strouden Avenue
1950	Bailey, Mrs. A. A.	"
1963	Bailey, P. W.	"Upmeads", Glenmoor Road, Ferndown,
1964	Balch, Miss M. M., M.B.E., B.A	Flat 3, 37 Queen's Park South Drive
1962	Balfour-Browne, Miss E. F.	Acorn Cottage, Station Road, Verwood
1957	Baly, Miss O. M.	70 Brackendale Road
1956	Bartrop, W. T. C., B.COMM.(LOND.), J.P.	11 Penrith Road, Boscombe
1956	Bartrop, Mrs. M. L.	" "
1964	Bates, Mrs. G. E.	29 Lascelles Road
1944	Bell, T. M., B.A., M.B., B.Ch., M.R.C.S., L.R.C.P.	5a Stourwood Avenue, Southbourne
1941	Bell, Mrs. R. M.	" "
1942	Bennett, Miss D.	Caradon, Canford Cliffs Avenue, Parkstone
1942	Bennett, Miss M.	" "
1963	Bennetts, Miss K. M.	57 Harland Road, Southbourne
1947	Berrill, Miss M. E.	Royal Exeter Hotel, Bath Road
1942	Bickel, T. H.	10 Ormonde Road, Branksome Park
1962	Binks, Miss I.	78 Southbourne Road, Southbourne
1946	Blackmore, H. C., L.D.S., R.C.S.	17 Ferry Road, Southbourne
1946	Blackmore, Mrs. E. E.	" "
1964	Blower, Miss M.	105 Ringwood Road, Verwood

1960	Boite, E. E. G.	17 Browning Avenue, Boscombe Manor
1957	Booth, Mrs. L.	41 Cedar Avenue, Christchurch
1956	Boulton, Miss E. L.	2a Stour Road, Queen's Park
1962	Bowers, Mrs. M. P.	2 Wootton Court, Wootton Mount
1964	Brady, J. R.	Compton Acres, Canford Cliffs
1956	Brain, Miss C. M.	16 Knole Road
1964	Brewer, Mrs. R. L.	39 Hengistbury Road
1964	Brown, Miss L.	24 Bingham Road, Winton
1962	Brown, Miss V. C.	13 St. Winifred's Road
1960	Brunstrom, Mrs. J. B.	6 Bradburne Road
1951	wBull, A. W. M., C.B.	Broom House, Chiltern Road, Hitchin
1964	Burford, Miss P. H., B.A.	36 Stourcliffe Avenue, Southbourne
1964	Burroughs, Miss I. K.	14 Richmond Park Avenue
1930	Bury, Miss G. J.	4 Berne Court, Grove Road
1946	Busby, Miss A. G.	Flat 4, 77 Haven Road, Canford Cliffs
1952	Butcher, A. J., F.R.I.B.A.	"Hilton", Dudsbury Avenue, Ferndown
1957	Butler, G. W.	Old Park Farm, Lytchett Matravers
1960	Butler, Mrs.	„ „
1954	Byrt, A. H., C.B.E.	14 St. Winifred's Road
1928	LCalkin, J. B., M.A., F.S.A.	Virginia House, Langton Matravers
1961	Campbell, Miss M.	"Chadwell", Friars Road, Friars Cliff
1958	Capstick, F., F.I.A.C.	7 Viking Way, Southbourne
1958	Capstick, Mrs. W.	„ „
1964	Cartwright, Miss D. E., M.B.E	31 Wistaria House, Redhill Drive
1943	†vChambers, E., F.L.S.	3 Gainslea Court, Derby Road
1950	Chambers, Mrs. E.	„ „
1955	Chambers, Miss H. M.	9 Tower Road, Branksome Park
1959	Charter, A.	Flat 3, 1 Cavendish Place
1959	Charter, Mrs. E. E.	„ „
1945	Cheesman, Mrs. A.	The Ken, Walkford Road, Walkford,
1945	Child, Miss L. M.	31a Southbourne Road
1912	L*Chilver, Miss K. M.	c/o 66 St. Alban's Avenue
1951	Chomé, E. E. P.	6 Alyth Road
1942	Chomé, Mrs. W.	„
1950	Churches, Mrs. E. W., M.B., Ch.B.	The White House, Colebrook Street, Winchester
1962	Clark, Mrs. F. M.	12 Alum Chine Road
1958	Clarke, Miss A. M., B.A.	11 Campbell Road, Southsea
1945	†vClarke, H. E., M.A., B.Sc., F.R.I.C.	4 Gardens Court, Parkstone Road, Poole
1945	Clarke, Mrs. M.	„ „
1927	*Clay, R. C. C., M.D., F.S.A.	The Manor House, Fovant, Wilts
1963	Clode, J. C.	Barclay's Bank House, London Airport, Hounslow
1964	Close, P. J. S.	Top Flat, 4 Crabton Close Road, Boscombe
1958	Cocke, M. H.	18a Penn Hill Avenue, Parkstone
1961	Coe, Mrs. G.	33 Cavendish Road
1946	Cohen, E., F.Z.S., M.B.O.U.	"Hazelhurst", Sway, Hants
1926	*Cooper, H. A.	125 Queen's Park Avenue
1941	LCooper, Mrs. E. M.	„ „
1951	LCooper, Miss R. I.	„ „
1945	Cooper-Hunt, Major C. L., M.A., R.A (Retd.), ch.D.	40 Marine Drive East, Barton-on-Sea
1945	Cooper-Hunt, Mrs. E. G.	„ „
1964	Corbin, A. F.	40 Belvedere Road
1957	Corby, J. W.	C/o B.M./F.F.Q.P., London, W.C.1
1952	Corser, Miss G. M.	3 Aspen House, Elm Grove Place, Salisbury, Wilts.
1956	Cox, Miss M. G. E.	7 Chessington Ct., Durley Chine Road
1948	Cox, W. S. I., F.R.E.S.	248 Castle Lane
1948	Cox, Mrs. E. D.	„

1962	Cragg, Miss M. A.	Bourne Hall Hotel, Westbourne
1962	Critchley, Mrs. M. M.	2a New Street, Ringwood, Hants.
1903	*oCurtis, W. Parkinson, F.R.E.S. F.Z.S.	130 North End House, Fitz James Ave., W.14
1959	Cuthbertson, Miss R. E.	179a Richmond Park Road
1959	Cutland, W.	South Riding, Honey Lane, Burley, Hants
1959	Cutland, Mrs. H. M.	„ „
1960	Dalrymple-Watt, Lady G. V.	1 Berwick Road, Talbot Woods
1959	Danne, Miss E. M. M.	Flat 5, 12a Branksome Wood Road
1964	Darling, P. J.	Holtvale Farm, Holt, Wimborne
1963	Davies, Mrs. M. J.	21 Sea Road, Boscombe
1964	Davis, Mrs. M. M.	6 Wollaston Road, Southbourne
1964	Day, Mrs. A.	15 Bosley Way, Christchurch
1952	Day, Mrs. E. I.	16 Coryton Close, Dawlish, Devon
1955	Deakin, R. H., M.Sc.	Coppins, Harvey Lane, Canford Magna
1960	Deakin, Mrs. E. M.	„ „
1957	Dear, Miss D.	23 Burnham Drive
1930	*de Castro, H.	72 Springdale Avenue, Broadstone
1962	Dennis, Miss R. S., S.R.N.	32 Crabton Close Road
1935	Derry, Mrs. H. E.	33 Belle Vue Crescent, Southbourne
1964	Dichmont, R. W.	25 Panorama Road, Sandbanks
1964	Dichmont, Mrs. W. A.	„ „
1962	Dickson, A. A.	"Muskerry", 23 Sandy Lane, Upton
1961	Dixon, Sir Arthur, C.B., C.B.E., B.A.	Bourne Hall Hotel, Westbourne
1949	Dixon, Miss H. C.	Meyrick Grange, 50 Christchurch Road
1961	Dixon, Mrs. H. M.	3 Richmond Park Crescent,
1958	Domney, Miss M.	Flat 2, 77 Haven Road, Canford Cliffs
1960	Dool, Mrs. N. M.	55 East Howe Lane
1960	aDool, Miss J. P. M.	„
1964	Downe, Mrs. F. E.	67 Portchester Road
1961	Draper, Mrs. G.	68 St. Alban's Avenue, Queen's Park
1953	Dudley, D. J.	17 Widdicombe Avenue, Parkstone
1955	Dudley, Mrs. I.	„ „
1953	Eaton, Mrs. V. W.	12a Alum Chine Road, Westbourne
1956	Edmonds, Miss K. E.	74 Namu Road, Winton
1963	Elliott, Mrs. D.	85 South Road, Boscombe
1963	Elliott, Mrs. M. S.	24 Tower Road, Branksome Park
1946	Ellison, Prof. F. O'B., M.D., F.R.A.S.	Pine Apple Cottage, Burton
1955	†Exton, Miss F. M., B.A.	34 Barnhill Road, Ridge, Wareham
1960	Exton, Miss J. M.	„ „
1959	Falvury, P.	Alpine, Warren Road, Westbourne
1953	Farwell, Mrs. S. M. A.	Latch Farm, Fairmile, Christchurch
1964	Faulkner, J. W. T.	Bourne Hall Hotel, Westbourne
1956	Fergusson, Mrs. C. A. M.	137 Overcliff Drive, Southbourne
1957	Fiddes, Mrs. I. A.	Tetherdown, Cull Lane, New Milton
1963	Field, A. J., M.C., B.Sc., F.I.M.	85 Lower Blandford Road, Broadstone
1963	Field, Mrs. E., B.Sc.	„ „
1934	Finnis, Miss F. M.	27 Julian's Road, Wimborne
1951	†wFisher, J., M.A., F.L.S., F.Z.S.	The Old Rectory, Ashton, Northampton
1957	Fishlock, H. W., B.Sc.	319 Belle Vue Road, Southbourne
1957	Fishlock, Mrs. F. M. V.	„ „
1963	Fletcher, D.	10 Cricket Close, Mudeford, Christchurch,
1954	Follett, Mrs. V.	Windward, Stevenson Crescent, Parkstone
1962	Foote, H. N., F.S.M.C., D.Opt.	Park Walk, Shaftesbury, Dorset
1963	Fox, Mrs. V.	17 Shaftesbury Road
1945	Foyle, A. A.	"Therapeia", Wilderton Road, Branksome Park

1963	Freeman, Miss R. C.	14 St. Augustin's Road
1960	Gahan, Mrs. M.	215 Holdenhurst Road
1961	Galbraith, T., J.P.	71 Carbery Avenue, Southbourne
1957	Galbraith, Mrs. A.	" "
1956	Gandy, Mrs. L.	11 Cranleigh Gardens, Southbourne
1955	Gardiner, P. C., F.R.I.C., M.I.Chem.E., M.Inst.Gas.E.	61 Ophir Road
1961	Gee, E. R., M.A., Sc.D., D.I.C., F.G.S.	3 Felton Crescent, Highcliffe
1951	Goddard, Miss E. F.	215 Holdenhurst Road
1963	Goldie, A. C.	20 Balcombe Road, Branksome Park
1963	Goldie, Mrs. C. D. M.	" " "
1963	Goldie, E. C. W.	" " "
1959	Gompel, M. E.	12 Chigwell Road
1937	Gompel, Mrs. M. K.	"
1960	Good, Prof. R., M.A., Sc.D.	8 Durlston Road, Parkstone
1960	Good, Mrs. P. G.	" "
1949	Goodhart, Mrs. M. S.	West Thorpe, Lymington
1956	Goodman, Miss J. R.	6 Pine Wood Road, Branksome Park
1942	Gorringe, Miss K. M.	11 Branksome Dene Road, Westbourne
1963	Goulton, Mrs. V. O. A. A.	Flat 2, 39 Branksome Wood Road
1963	Graham, Miss C.	1 Horsa Close, Horsa Road
1956	Graham-Vine, Mrs. F. E.	Moorfield, 1 Bodorgan Road
1960	Grattan, Miss L. T.	Solent Cliffs Hotel, West Cliff
1953	Gray, Miss E.	44 Edmondsham House, Terrace Road
1956	Green, Miss G. M., B.A.	17 Clifton Road, Parkstone
1941	Gwyther, W. T.	12 Foxholes Road, Southbourne
1956	Habershon, Miss E. M.	Leas Court, Cliff Drive, Canford Cliffs
1951	Haines, Miss G. M.	Appleslade, Linwood, Ringwood
1951	Haines, Miss R. M.	" "
1961	Haines, Miss E. S.	"Little Orchard", Godshill, Fordingbridge, Hants
1962	Hall, Mrs. E., B.Sc. (Hons)	16 Beresford Road, West Southbourne
1957	Halliday, Mrs. M.	78 Clingan Road, Iford
1953	Hancock, Mrs. C. E.	912 Castle Lane East, Iford
1959	Hannam, B., M.P.S.	16 Hazelwood Avenue, New Milton
1955	Hannam, Mrs. W.	" "
1959	Hards, Mrs. D. K.	30 Dean Park Road
1960	Hardy, Miss L. H.	20 The Grove, Redhill Park
1951	Harlock, Miss M. L.	44 Heather View Road, Branksome
1961	Harper, Miss A. C.	"Chadwell", Friars Road, Friars Cliff
1963	Harris, Mrs. H. I.	"Carbery", Ashley Lane, Hordle, Hants
1955	Harris, H. V.	15 St. Winifred's Court, St. Winifred's Rd.
1958	Harris, Mrs. W. I.	" "
1958	Mart, Miss C. L., S.R.N.	The Thatched Cottage East, Godwin's Croft, Bransgore, Hants
1961	Harvey, Mrs. F. E., M.B., Ch.B.	C21, San Remo Towers, Boscombe
1959	Harvey, Miss G. E. J.	50 Alum Chine Road
1964	Hatton, R. H. S., M.A.	The Small House, Llangennith, Glam.
1951	Hawker, Mrs. E.	64 Alumhurst Road
1949	Hayley, Miss V. G.	Sandykeld Hall, Manor Road
1951	Hayman, Miss M. S.	39 Queen's Park South Drive
1956	Heath, Mrs. C. J.	2 Richmond Court, Hawkwood Road
1954	Henderson, Miss V.	19 Ashmore Avenue, Hamworthy, Poole
1954	Hermon, J. A.	43 Stourcliffe Avenue, Southbourne
1961	Higgs, Miss D. H.	1036 Ringwood Road, West Howe
1961	Higgs, Mrs. M.	" "
1952	Hilton, Mrs. D.	2 Green Gardens, Northam, Bideford
1956	Hinton, Miss E. M.	1 Lonsdale Road
1962	Hipperson, Miss M.	69 Headswell Avenue

1962	Hodson, Prof. F., Ph.D., F.G.S.	Geology Dept., University of Southampton
1961	Hodgson, Miss N.	Flat 1, 45 Howard Road
1960	Holbrook, H. S., B.Sc., M.I.E.E., Fel.A.I.E.E.	5 Staunton House, Exeter Park Road
1963	Holbrook, Mrs. M. E.	" " "
1962	Holmes, Mrs. N. E. F.	7 St. John's Road, Boscombe
1952	Holroyd, G.	4 Beechey Road
1961	Hooton-Smith, E. W.	36 Wellington Road
1961	Hooton-Smith, Mrs. B. E.	" "
1957	Hunt, W. H.	Flat 1, 5 Alton Road, Parkstone
1954	Hunt, Mrs. A. K., B.Sc.	" "
1952	Imlach, Mrs. M. G., B.A.	2 Redcotts, Wimborne, Dorset
1954	Irwin, Mrs. B. C.	16 Duncliff Road, Southbourne
1959	Jackson, Miss M.	1360 Christchurch Road
1933	James, Mrs. M. G.	70 St. Alban's Avenue
1960	James, W. H.	Oaklea, 115 Tuckton Road, Southbourne
1945	Jenkins, Miss P.	Galltfaenan, Trefnant, Denbigh
1957	Jenoure, Miss C. A.	Eagle Crest, Belle Vue Road, Parkstone
1957	Jenoure, Miss D.	" "
1963	Johnson, Miss E. R.	36 Stourcliffe Avenue, Southbourne
1964	Johnson, Miss W. L.	15 Herbert Road, Westbourne
1962	Jones, Miss O. E. C., S.R.N.	86 Hoburne Farm Park, Christchurch
1963	Jowett, B. A.	528 Charminster Road
1928	Kendall, Miss G. J., A.R.C.M.	20 Serpentine Road, Poole
1963	Kenworthy, Mrs. J. S. G.	8 Ripon Road, Winton
1946	King, Miss A.	14 Florence Road, Boscombe
1944	Kirke, Miss M.	3 Fairthorne Court, 27a Bodorgan Road
1959	Knight, Miss J.	106 Petersfield Road
1964	Lambert, F. H., F.R.I.B.A.	50 Hillside Drive, Christchurch
1964	Lambert, Mrs. D. M.	" "
1956	Lavender, J. H., B.Sc., A.R.C.S.	Heather Lodge, Bransgore, Christchurch
1959	Lawes, A. V.	48 Seafield Road, Southbourne
1962	Leake, Mrs. I. B.	21 Langside Avenue, Parkstone
1958	Leeland, Mrs. F.	34 Noel Road, Wallisdown
1948	Leonard, Mrs. N.	1 Neville Court, Derby Road
1957	Le Roy, Miss E. S. H.	Forest Mead, Tyrell's Ride, Burley, Hants
1957	Le Roy, Miss M. C. G.	" "
1958	Le Sueur, Mrs. D. G.	49 Wellington Road
1961	Lewis, Miss D. M.	150 Mudeford Lane, Mudeford
1960	Lightfoot, B., O.B.E., M.C., M.A., F.G.S.	Bingley Farm Lane, Barton-on-Sea
1951	Lloyd, G. B., B.A.	58 Glenferness Avenue
1950	Locke, G. S.	85 Seafield Road, Southbourne
1950	Locke, Mrs. J. B. E., B.A.	" "
1947	Logan, Miss A.	3 Grosvenor Court, Vale Road
1952	Logie, Mrs. G.	Flat 1, "Pendennis", Derby Road
1963	Lopes, Mrs. K. M.	11 Caledon Road, Parkstone
1957	Lovell, Mrs. L.	36 Merley Way, Wimborne
1939	Lowde, Miss E., B.A.	83 York Road, Broadstone
1951	wLowe, Mrs. D. M.	43 Marryat Road, Wimbledon, S.W.19
1934	v†Lowther, Miss D. M., B.Sc.	Lonsdale, 15 Mayfield Avenue, Parkstone,
1956	Maddox, Mrs. L. M.	31 Egerton Road, Queen's Park
1964	Mansfield, G. A.	Milton, Church Road, Ferndown
1964	Mansfield, Mrs. O. K.	" "
1959	Mariette, Miss G. A.	4 Mansfield Avenue, Parkstone
1956	Marks, Miss K. M.	11 Ennerdale Road, Kew Gardens, Richmond, Surrey
1948	Markwick, Miss D. S.	29 Meyrick Park Crescent

1946	Marshall, Miss D.	76 Palace View, Bromley, Kent
1954	Marshallsay, Miss E. N.	6 Overcliff Mansions, 1 Manor Road
1954	Marshallsay, Miss L. E.	" "
1964	Masters, Miss K. F.	10 West Way Close, West Way
1958	Mate, Mrs. F. M.	8 Clifton Road, Parkstone, Poole
1957	Mathews, Miss G. B.	25 Wingfield Court, Manor Road
1960	Maxted, Mrs. G. E.	2a Wilfred Road, Boscombe
1950	Mayo, Mrs. S. E.	18a Elgin Road
1963	MacKeith, Miss M. R., B.Sc.	13 Addis Square, Southampton
1956	McClay, H.	64 Blake Dene Road, Lilliput, Poole
1956	McClay, Mrs. A. E.	" "
1953	McKeown, Miss K. E.	15 Ravine Road, Southbourne
1950	Meggett, Lt. Col. E. E., V.D.	14 Southlea Avenue, Southbourne
1950	Meggett, Mrs. K. M., M.B.E.	" "
1962	AMesserschmidt, K.	Serrano 59, Madrid 6, Spain
1963	Michael, Rev. Bro., F.R.G.S., B.A. (Hons.), D.A.S.E.	St. Peter's School, Bournemouth
1956	Middlemast, A. H.	86 Hengistbury Road, Southbourne
1956	Middlemast, Mrs. M.	" "
1958	Middleton, Mrs. J. M., B.Sc.	Horn Cottage, Burley Road, Nr. Bockhampton
1964	Middleton, W. J.	34 Compton Avenue, Parkstone
1964	Miller, A. C.	2 Woodland Ct., Branksome Wood Road
1964	Miller, Mrs. W. R.	" "
1962	Milne-Day, D. L.	"Southfield", Burley, Ringwood, Hants.
1956	Mills, Miss N.	20 Marlborough Road
1959	Mitton, J. C., A.C.A.	3 Gainsborough Road
1963	Mondon, J. H., A.F.A.S., A.R.S.H.	Albert Chambers, Albert Road
1957	Moore, W.	139 Alder Road, Parkstone
1962	Moore, Mrs. J.	" "
1959	Morgan, Commander S. T., O.B.E., R.N. (Retd.)	Bracken Cottage, Blissford, Fordingbridge, Hants
1959	Morgan, Mrs. V.	" "
1964	Morton, Miss E. M. W.	21 Pinebeach Court, Canford Cliffs
1955	Moss, C. A.	E41, San Remo Towers, Boscombe
1963	Moss, F. W.	39 Hengistbury Road, Southbourne
1963	Moss, Mrs. D. M.	" "
1962	Mott, Miss J. H.	2 Warren Avenue, Mudeford, Hants.
1960	Nelson, A., F.C.A.	65 Alyth Road, Talbot Woods
1963	Newton, Mrs. K. F.	Rose Hill Hotel, Mac Andrew Road, Canford Cliffs
1943	LNicholls, Miss G.	
1962	Odell, F. H. B.	Cottonwood Hotel, East Overcliff Drive
1964	Odom, Miss E. V.	18 Church Road, Southbourne
1929	Ogden, Miss E.	1 Rossini Cottage, Hedgemead, Bath
1948	Ogden, F.	Cottonwood Hotel, East Overcliff Drive
1964	Ogle, Rev. D., B.A.	St. Peter's School, Bournemouth
1950	Ogle, Miss U.	2 Frankland Crescent, Parkstone
1960	Ollier, G.	202 Harewood Avenue, Queen's Park
1960	Ollier, Mrs. B.	" "
1959	Oppé, E. F.	"Peakey", Worth Matravers, Swanage
1948	Osborne, Mrs. B. E.	B6, San Remo Towers, Boscombe
1944	Owen, Mrs. E.	2 Rotherfield Road, Boscombe
1958	Page, W. E., M.A.	53 Petersfield Road, Boscombe East
1945	Paris, Lt.-Col. A., R.E. (Retd.)	11 Stourwood Road, Southbourne
1956	Paris, Mrs. G.	" "
1963	Payne, Miss H. I.	83 St. Luke's Road
1916	*LPenrose, Miss F.	Little Picket, Hightown, Ringwood
1916	*LV†Penrose, Miss M., B.Sc.	" "

1948	Perceval, Mrs. W.	7 Benellen Avenue
1960	Perry, C. C.	15 Seafield Road, Southbourne
1963	Perry, W. F., B.Sc., F.R.G.S.	117 Portland Road
1961	Pesterfield, Miss M.	56 Gresham Road
1950	†Peters, Sir R. A., M.C., M.A., M.D., F.R.S.	3 Newnham Walk, Cambridge
1961	Phillips, P. P., Ph.D., F.R.I.C.	12 Talbot Avenue
1961	Phillips, Mrs. V. A. D.	"
1953	Pickering, V. T.	Francesca, Hightown, Ringwood, Hants
1953	Pickering, Mrs. C. G.	" "
1959	Pierce, Mrs. E. K.	4 Mansfield Avenue, Parkstone
1960	Piggott, H. E., O.B.E., M.A.	29 Wolverton Road, Boscombe
1959	Piper, P. J., F.R.I.C.S.	8 Leigham Vale Road, Southbourne
1959	Piper, Mrs. M. G.	" "
1962	Poole, Miss C. E.	24 Namu Road, Winton
1955	Porter, Miss D. A.	Deveron Lodge, 23 Christchurch Road
1964	Powell, Miss E. M.	16 Mildenhall, West Cliff Road
1957	Powis, Mrs. M. E.	37 Wheaton Road, Pokesdown
1960	Price, Miss A.	Alma Cottage, Ringwood Road, Ferndown, Dorset
1964	Prince, Miss E. M.	4 St. James Sq., New Mills, Nr. Stockport
1951	wQuillet, L. A.	"Sevenoaks", Springfield, Chelmsford
1951	Rayson, Mrs. M. C. J.	10 Heather Bank, Tower Road, Hindhead
1945	†vRead, W. J., M.Sc., F.R.I.C.	15 Carbery Avenue, Southbourne
1951	Read, Mrs. H. A.	" "
1957	Reakes, Rev. G. S., B.A.	The Cottage, 7 The Avenue, Branksome Park
1957	Reakes, Mrs. K. A.	" "
1945	Richards, Miss E. E., B.Sc.	8 Overcliff Mansions, Manor Road
1942	Richards, Miss M. C.	Stour Lodge, 21 Julian's Road, Wimborne
1958	Ridsdale, Mrs. M.	14 Erinbank Mansions, Manor Road
1949	Robertson, Mrs. M.	41 Christchurch Road
1954	Robertson, Miss V. L.	48 Crag Head, Manor Road
1949	Robertson, Mrs. W. M.	50 Alum Chine Road
1923	Roden, Miss E. M.	12 Walpole Road, Boscombe
1947	Rooke, K. B., M.B., B.Ch., M.B.O.U.	Cranborne, Wimborne
1964	Rose, Mrs. D., M.A.	5 East Avenue, Talbot Woods
1963	Rossiter, Mrs. D. M.	5 Park Homes, Cole Hill, Wimborne
1959	Rowe, Miss F.	23 Stourcliffe Avenue, Southbourne
1963	Rushton, Miss K. M., M.B., Ch.B., M.Sc.	20 Greenways, Highcliffe
1964	Rutherford, Mrs. G.	St. Mary's Gate School, Southbourne
1951	wSalisbury, Sir E., D.Sc., F.R.S., F.L.S.	Croindene, Strandway, Felpham, Bognor Regis, Sussex
1954	Saunders, Miss W. A.	11 Portman Crescent, Boscombe
1938	Seare, Mrs. S. F. E.	Almer, Blandford
1951	wSecretan, S. D.	Swaines, Rudgwick, Sussex
1963	Selfe, Mrs. M. D.	"Kiwikota", Ringwood Road, Ferndown
1960	Sephton, Mrs. N., M.B., Ch.B.	Flat 1, 4 Talbot Avenue
1951	Sewell, Mrs. I.	4 Maundeville Crescent, Christchurch
1941	Sexton, Miss F.	60 Uplands Road
1933	Sheffield, Miss I. E.	6 Lonsdale Road
1964	Sherlock, Mrs. P.	15 Herbert Road, Westbourne
1950	Shillidy, G. A., C.I.E.	Flat 10, 31 St. Peter's Road
1944	LShorthouse, B.	Brookside Cottage, Exeter Lane
1964	Simco, Miss I.	41 Colemere Gardens, Highcliffe
1937	Simmons, Mrs. I. M.	73 Spur Hill Avenue, Parkstone, Poole
1963	Simpson, Mrs. C.	Flat 46, Sunningdale, 28 Braidley Road

1920	Simpson, N. D., M.A., F.L.S., F.R.M.S.	3 Cavendish Road
1961	Sims, G. P. W.	22 Duncliff Road, Southbourne
1961	Sims, Mrs. M.	" "
1959	Slater, G. A.	58 Wentworth Avenue, Southbourne
1959	Slater, Mrs. E. M.	" "
1963	Slater, Miss M. A.	" "
1959	Slieker, Miss H. R. M.	133 Seafield Road, Southbourne
1963	Smith, D. V. H., M.I.Mech.E., M.I.H.V.E.	17 Little Forest Road, Talbot Woods
1963	Smith, Mrs. M. C.	" "
1963	Smith, Miss A. M.	" "
1964	ASmith, C. F.	127 Leybourne Avenue
1964	Smith, Mrs. E. H.	44 The Grove, Moordown
1960	Smith, Miss M., M.B.E., S.R.N.	1a Cecil Avenue, Queen's Park
1959	Soar, Miss I. M.	11 Grosvenor Road
1940	Somerville, Mrs. S.	Rumah Kechil, Pinewood Road, Ferndown
1962	Sparks, Miss A.	"Chenies", Plot 47, Wick House Estate, Downton, Salisbury
1962	Sparks, Miss M.	" "
1960	Statham, Miss B.	The Lighthouse, Hurn Road, Ringwood
1962	Stiff, Miss F. A.	19 Heathwood Road, Winton
1962	Still, D. C., F.S.M.C., D.Opt.	56 Highfield Road, Moordown
1956	Stray, J. F.	Browngates, Barton Lane, Barton-on-Sea
1957	Stray, Mrs. S. V. M.	" "
1964	Strevens, S. M.	153 Portland Road
1947	Stuart-Harris, Miss M., B.Sc.	Woodways, Merley Lane, Wimborne
1946	Stuart-Harris, Miss W., B.Sc.	" "
1960	Sunderland, Mrs. R. B.	18 Spur Hill Avenue, Parkstone
1962	Swann, A.	2 Huntvale Road
1950	Sworder, Miss R.	c/o Barclay's Bank Ltd., 659 Christchurch Road, Boscombe
1960	Sykes, Mrs. H. M.	16 Amberwood Drive, Walkford, Hants
1962	Tarrant-Willis, F. E.	52 St. Osmund's Road, Parkstone
1955	Taylor, Mrs. B.	164 Belle Vue Road, Southbourne
1959	Thomas, J. W., B.Sc., L.L.B., M.I.E.E., BARRISTER-AT-LAW	4 Albemarle Court, Manor Road
1964	Thorne, Mrs. M., B.A.	St. John's Vicarage, 1 Brunstead Place, Branksome
1956	Trail, Miss C. M. E.	St. Andrew's House, Droitwich
1961	Turnbull, A.	40 Southern Road, West Southbourne
1961	Turnbull, Mrs. A. M.	" "
1949	*Turner, G. A.	1 Poole Road
1963	Turner, L., B.Sc., M.I.C.E.	"Homewood", Chine Walk, Parley Cross, Wimborne
1959	Tyler, E. F.	43 Brackendale Road
1950	Venning, Brig. F. E. W., C.B., C.B.E., D.S.O., M.B.O.U.	Pinewood, Butts Ash, Hythe
1950	Venning, Mrs. E. L.	" "
1950	Venning, Miss E. J. L.	" "
1961	Vincent, Mrs. A. M., B.A.	Benniston House, 49 Christchurch Road
1961	Waldy, Mrs. V. M.	The Paddocks, Dover Road, Branksome Park
1955	Walker, Mrs. L. W.	12 Fernbank, St. Stephen's Road
1961	Wallace, Miss J. B., B.Sc. (Econ.)	10 St. Ives Park, Ringwood, Hants.
1961	Wallis, Miss M. E.	2 Warren Avenue, Mudeford, Christchurch
1952	Warden, Miss F. H., M.C.S.P.	12 R.L. Stevenson Avenue
1941	*†LWVWatt, Mrs. W. Boyd, F.Z.S., M.B.O.U.	52 Wimborne Road

1946	Watts, Miss N. E.	Flat 1, 33 Cavendish Road
1947	West, Miss G. M.	The Knapp, Studland, Dorset
1961	Weston, Miss S. A.	Flat 2, Earlston, 8 Portarlington Road
1958	Wheeler, C. A. P.	c/o Westminster Bank, 74 Kilburn High Road, London, N.W.6
1958	Whimster, Miss L.	C/o 8 Wallace Road, Broadstone, Dorset
1924	Whitaker, Miss E. M.	22 Somerset Road, Boscombe
1924	Whitaker, S. E., A.R.I.C.S.	22 Selwood Road, Addiscombe, Croydon
1962	White, Mrs. A. W.	4 Clifton Road, Southbourne
1963	White, Miss D. L. M.	23 Pinewood Road, Branksome Park
1963	White, Miss J.	„ „
1964	Whitehead, T.	27 Minstead Road, East Howe
1955	Whittle, W. L., M.I.M.E., M.I.F.	31 Elgin Road, Parkstone, Dorset
1955	Whittle, Mrs. L.	„ „
1955	Williams, Mrs. G. E.	Pineheath, De Maulley Road, Canford Cliffs
1963	Winser, Miss M. M.	3 Mount Blairy, 23 St. Winifred's Road
1950	v†Winter, W. P. B.Sc.	27 Horsa Road
1951	Winter, Mrs. H.	„
1956	Wise, Mrs. B.	55 Namu Road, Winton
1959	Witherby, H. L.	9 Commercial Road, Parkstone
1960	Withers, A. E., F.A.I.	13 Beechey Road
1960	Withers, Mrs. D. E.	„
1948	AWood, Miss E. B., B.Sc.	4 New Park Road, West Southbourne
1958	Wood, F. J.	17 Montague Road
1964	AWood, R. L.	„
1964	Wood, Miss M. L.	19 Gainsborough Road
1956	Wood, T. E., M.A., LL.B.	21 Durley Chine Road
1964	Wooder, A., C.B.E., M.I.FireE.	10 Partridge Drive, Lilliput
1957	Woodger, Miss M. J.	70 Brackendale Road
1960	Woods, Miss M.	Alma Cottage, Ringwood Road, Ferndown
1953	Wootton, Miss E. M.	22 Elgin Road
1949	†vWray, D. A., M.Sc., Ph.D., F.G.S.	42 Canford Cliffs Road
1949	Wray, Mrs. A.	„
1956	Wray, Miss J., S.R.N.	„
1946	Wycherley, Mrs. L.	11 Hayes Avenue, Queen's Park
1960	Yeatman, Mrs. M.	Lantern House, Avenue Road, New Milton
1964	Young, Miss A. M., L.L.A.	6 Salisbury Road, Boscombe
1958	Yule, Mrs. M. P.	89 Orchard Avenue, Parkstone

Bournemouth Natural Science Society

List of Presidents (1903–1965)

1903—04	J. E. Beale (Mayor of Bournemouth).
1904—06	G. E. J. Crallan, M.A., M.B., M.R.C.S.
1906—07	H. J. Waddington, F.L.S.
1907—09	A. Ransome, M.A., M.D., F.R.C.P., F.R.S.
1909—10	A Smith Woodward, D.Sc., F.R.S., F.L.S., F.G.S.
1910—11	Dukinfield H. Scott, M.A., LL.D., F.R.S., F.L.S., F.G.S.
1911—13	Sir E. Ray Lankester, K.C.B., M.A., LL.D., F.R.S., F.L.S.
1913—16	Sir Daniel Morris, K.C.M.G., J.P., M.A., D.Sc., D.C.L., F.L.S.
1916—17	The Rt. Hon. the Earl of Malmesbury, D.L., J.P.
1917—18	Sir Jethro J. H. Teale, M.A., D.Sc., LL.D., F.R.S.
1918—20	Field-Marshall Lord Grenfell of Kilvey, G.C.B., G.C.M.G., LL.D., F.S.A.
1920—21	Lt.-Col. Sir David Prain, C.M.G., C.I.E., F.R.S.
1921—23	F. G. Penrose, M.D., F.R.C.P., F.Z.S., M.B.O.U.
1923—24	Sir F. W. Keeble, K.B.E., D.Sc., F.R.S.
1924—26	Hubert Painter, B.Sc., F.C.S.
1926—28	Heywood Sumner, F.S.A.
1928—29	Claude Lyon
1929—30	Professor F. O. Bower, D.Sc., F.R.S.
1930—31	Henry Bury, M.A., F.L.S., F.G.S.
1931—32	Dukinfield H. Scott, M.A., LL.D., F.R.S., F.L.S., F.G.S.
1932—33	J. P. Williams-Freeman, M.D.
1933—34	Rev. F. C. R. Jourdain, M.A., F.Z.S., M.B.O.U.
1934—35	Sir F. W. Dyson, K.B.E., M.A., D.Sc., LL.D., F.R.S., F.R.A.S.
1935—36	Henry Bury, M.A., F.L.S., F.G.S.
1936—37	Sir Harold Carpenter, M.A., D.Sc., F.R.S.
1937—38	Professor John Cameron, M.D., D.Sc., F.R.S.E.
1938—39	Professor G. D. Hale Carpenter, M.B.E., D.M., F.L.S., F.Z.S., F.R.E.S.
1939—40	W. G. Aitchison Robertson, M.D., D.Sc., F.R.C.P., F.R.S.E.
1940—41	Rev. Professor M. C. Potter, M.A., D.Sc., F.L.S.
1941—42	Inst.-Capt. M. A. Ainslie, R.N., M.A., F.R.A.S.
1942—43	William C. Simmons, B.Sc., A.R.C.S., F.G.S.
1943—44	Professor S. Mangham, M.A.
1944—45	A. S. Hemmy, B.A., M.Sc.
1945—46	J. F. N. Green, B.A., F.G.S.
1946—47	Lt.-Col. G. C. Drew, D.S.O., F.S.A.
1947—48	W. J. Woodhouse, A.C.P.
1948—49	Edward Hindle, M.A., D.Sc., F.R.S., F.Z.S.
1949—50	Mrs. W. Boyd Watt, F.Z.S., M.B.O.U.
1950—51	Professor Sir R. A. Peters, M.C., M.A., M.D., F.R.S.
1951—52	Ernest Chambers, F.L.S.
1952—53	F. Williamson, F.R.Hist.S.
1953—54	H. E. Clarke, M.A., B.Sc., F.R.I.C.
1954—55	W. J. Read, M.Sc., F.R.I.C.
1955—56	W. S. Brown, B.Sc.
1956—57	A. W. Legat, M.Inst.C.E., M.I.S.E.
1957—58	D. A. Wray, M.Sc., Ph.D., F.G.S.
1958—59	Miss M. A. M. Penrose, B.Sc.
1959—60	Miss D. M. Lowther, B.Sc.
1960—61	James Fisher, M.A., F.L.S., F.Z.S.
1961—62	W. P. Winter, B.Sc.
1962—63	F. H. Perring, M.A., Ph.D.
1963—64	Miss F. M. Exton, B.A.
1964—65	Dame Kathleen Lonsdale, D.B.E., D.Sc., F.R.S.

BOURNEMOUTH NATURAL SCIENCE SOCIETY

Summary of the Accounts for the year ending September 30th, 1964

1962/63	Receipts	£ s. d.	£ s. d.
572 17 6	Subscriptions to 30.9.64 ..	570 15 0	
54 5 11	Covenant Tax Refunds, rents, etc.	51 0 8	
			621 15 8
225 0 0	Royal Commonwealth Society	244 11 0	
75 0 0	Camera Club	75 0 0	
— – –	Bournemouth Temperance Council	8 8 0	
			327 19 0
17 11 10	Royal Commonwealth Society Gas refund ..	22 9 0	
7 10 9	Telephone call box ..	6 14 3	
3 15 0	Projector fees	3 10 0	
15 15 0	Sundries	2 13 0	
			35 6 3
8 1 5	Field meetings refunds ..	30 10 6	
48 17 11	Garden Party	64 3 4	
4 2 6	New Year Party	10 15 10	
20 15 6	Teas (net)	20 1 4	
			125 11 0
21 0 0	Donations		105 0 0
	Total of Ordinary Receipts		1215 11 11

1962/63	Payments	£ s. d.	£ s. d.
128 4 10	Caretaker (Wages and Insurance)	129 15 0	
46 16 0	Insurance	148 4 8	
380 15 9	Maintenance	61 5 7	
224 6 6	Rates	211 12 3	
			550 17 6
21 12 8	Coal	21 10 0	
144 4 11	Gas	150 19 10	
127 3 2	Electricity	121 15 6	
12 8 3	Water	12 9 11	
			306 15 3
47 14 7	Postages	43 10 2	
165 15 3	Printing and Stationery ..	138 16 9	
98 0 0	Proceedings	98 0 0	
37 0 7	Telephone	34 7 1	
			314 14 0
90 0 0	Garden	60 0 0	
11 17 1	Library	26 5 1	
			86 5 1
22 14 0	Subscriptions to other Societies	16 6 0	
51 5 8	Sundries	26 15 11	
			43 1 11
	Total of Ordinary Expenses		1301 13 9

285	*14*	*6*	Interest on Investments ..	242	19	2		
167	*12*	*9*	Income Tax refund (interest)	132	9	11		
							375	9 1
			Receipts other than Ordinary					
		—	Sale of £2,300 5% Conversion Stock				2354	4 6
		—	Transferred from Deposit Account				2050	0 0
		—	Transferred from Building Fund Special Reserve				171	8 7
		—	Donations to Chair Fund				123	10 6
		—	Sale of surplus Museum items				139	0 0
		—	Balance at Bank 30.9.63 ..	403	17	4		
			Cash in hand		8	2		
							404	5 6
							£6833	10 1

			Payments other than Ordinary					
1476	*14*	*10*	Maintenance (non-recurring)				431	6 6
			Transferred to Deposit Account				2854	4 6
			Purchase of £2000 Bournemouth Corporation Mortgage				2000	0 0
			Balance at Bank 30.9.64 ..	145	11	2		
			Cheque in hand	100	0	0		
			Cash in hand		14	2		
							246	5 4
							£6833	10 1

We have examined the above Accounts with the Books of the Society and Vouchers for payments and certify the same to be correct.

Signed :— ALBERT V. LAWES, *Auditor* 10/10/64.

A. H. MIDDLEMAST, *Auditor* 10/10/64.

F. J. WOOD, *Hon. Treasurer*

BUILDING FUND — Special Reserve

	£	s.	d.		£	s.	d.
Balance on Deposit at Bank 30.9.63	167	16	5	Transferred to Current Account	171	8	7
December 31.63 Interest	3	6	9	Account closed February 5th, 1964			
February 5.64 Interest		5	5				
	£171	8	7		£171	8	7

DEPOSIT ACCOUNT

	£	s.	d.		£	s.	d.
Balance on Deposit at Bank 30.9.63	124	2	10	November 27.63 To Current Account	2000	0	0
December 31.63 Interest	6	8	6	May 11.64 To Current Account	50	0	0
November 7.63 Deposit from Current Account	2854	4	6	Balance on Deposit at Bank 30.9.64	934	15	10
	£2984	15	10		£2984	15	10

GARDEN ACCOUNT

	£	s.	d.		£	s.	d
Balance Brought Forward 30.9.63	30	0	0	Gardener	69	0	0
For Treasurer	30	0	0	Lawn Sand	3	18	9
For Treasurer	30	0	0	Hose	2	15	0
				Sundries		15	10
				Balance in Hand 30.9.64	13	10	5
	£90	0	0		£90	0	0

LIBRARY ACCOUNT

	£ s. d.		£ s. d.
Balance at Bank and in Hand 30.9.63	126 19 8	Librarian's Expenses	23 2 4
From Hon. Treasurer (refund of 1962/63 Librarian's Expenses)	26 5 1	Library Maintenance	22 6 6
Sale of Books and Periodicals	13 16 8	Balance at Bank and in Hand 30.9.64	121 12 7
	£167 1 5		£167 1 5

FIELD MEETINGS ACCOUNT

	£ s. d.		£ s. d.
Cash in hand 30.9.63	17 8 3	Expenses Field Meetings	9 2 4
Surplus from Coaches	33 9 6	Transferred to General Account	30 10 6
		Cash in Hand 30.9.64	11 4 11
	£50 17 9		£50 17 9

INVESTMENTS

	Cost £ s. d.	Approximate Value 30th Sept., 1964 £ s. d.
£1000 British Transport Stock 3% 1978/88	775 4 0	648 15 0
£2000 County Borough of Bournemouth Mortgage Bond 5½% 1968	2000 0 0	2000 0 0
£200 County Borough of Bournemouth Mortgage Bond 5½% 1966	200 0 0	200 0 0
£500 County Borough of Bournemouth Mortgage Bond 5¾% 1966	500 0 0	500 0 0
£1500 Consolidated Stock 4%	979 0 0	971 5 0
£1200 4¼% British Electricity Stock 1974/79	984 4 0	1008 15 0
£1600 6% Borough of Barking Mortgage Loan 1966	1600 0 0	1600 0 0
£600 6% Exeter Corporation Mortgage Loan 1966	600 0 0	600 0 0
	£7638 8 0	£7528 15 0

Report of the Council for the year ending 30th September, 1964

Council deeply regrets Mr. T. H. Bickel's indisposition and his enforced resignation, on medical advice, from the position of Honorary Secretary. His unfailing courtesy, cheery approach and wise counsel will be very greatly missed by all.

Concluding a term of office lasting five years, our Chairman has also tendered his resignation. Throughout this period, Mr. H. V. Harris led to a successful conclusion the negotiations concerning the strip of land, the virtual reconstruction of our ninety-year-old building, and an investment policy which enables the Society to face the future with confidence. For this strenuous and responsible work Mr. Harris has earned the gratitude of every member, present and future. It is fitting here also to pay tribute to our Hon. Architect, Mr. A. J. Butcher, F.R.I.B.A., who has placed his professional knowledge and skill at the disposal of the Society and has supervised from start to finish all the building and decorating work. He has devoted a great deal of time and energy to this honorary but none the less onerous task, and Council offers him its thanks.

Looking back on the year 1963-64, Council recognises that it has been a year of fulfilment, one in which members have given generously to the Society to mark their appreciation of the improved facilities now made available, and of the hard work done by officers and officials on their behalf.

The gifts started in a very modest way when seven members each provided a table-cloth for the Museum tables. Mrs. Chomé followed this up with a donation of £102. 10s. 0d. towards the cost of providing new chairs for the Museum. This challenge was immediately taken up: a subscription list was opened and an additional sum of £123. 10s. 6d. was soon collected to complete the purchase of chairs. Mrs. Withers provided a new carpet for the office; Miss Exton a handsome table for the hall; Mr. Withers the remarkably fine location board facing the entrance door; Mr. Harris the new official notice board; Mr. T. E. Wood two years' supply of sugar. Finally, Mrs. Osborne sent as a thank-offering a cheque for £100. This arrived at a most opportune moment when the Society was about to install a new sound-amplification system and was acquiring a modern episcope and a 35 mm. slide projector.

These gifts, large and small, have greatly improved members' comfort and added much to our amenities. Council offers grateful thanks to all generous donors. We have also received a collection of slides and transparencies through the bequest of the late Mrs. Muspratt.

Membership on September 30th, 1964 numbered 478, a decline of five on the previous year.

It is with great regret that Council has taken note of the deaths of the following members during the year: Major W. J. Beach (1964), Miss M. H. Fraser, B.A. (1953), Mrs. E. M. Haines (1931), Mrs. Hatton (1932) (Hon. Member), H. A Hayward, O.B.E., F.G.S. (1956), H. C. Mayo (1950), Mrs. Muspratt (1935), Mrs. G. Ogden (1948), H. L. Trotman (1957), S. J. White (1931). Obituary notices regarding Mrs. Haines, Mr. Hayward and Mr. Mayo will be found below.

Our President for the year, Miss F. M. Exton, B.A., was installed on October 28th, 1963, and gave us the eloquent address which appeared in last year's "Proceedings". This fascinating account of the world's physical characteristics as modified by Nature and latterly by Man complemented our President's many lectures and her most interesting and informative excursion talks which explained how Man had reacted to environment and climate in our own country.

Mrs. C. Simpson was appointed Chairman of the Archaeology and History Section in October, 1963. Members have seen with interest and pleasure the energy and knowledge she is applying to increase their appreciation of her subject. Mr. J. C. Mitton, A.C.A., has been appointed 'Slide Custodian' and is proceeding to catalogue the collections of slides and transparencies. A notable record of Sectional activities is contained in the illustrated diary of the Zoological Section, which has been displayed in the hall for all to see.

The reorganization of the Library goes forward under the guidance of the Hon. Librarian, Mr. H. S. Holbrook, B.Sc., and his helpers. The provision of books, new and old, continues steadily, and the Library is now a most pleasant place.

The House Committee has already fully justified its formation. An enormous amount of clearance work has made much space available for various purposes. The Committee is now in charge of the building, subject to the over-riding control of the F. and G.P. Committee and the Council. In the Spring, Council accepted an offer of £139 for certain surplus objects. This made a useful addition to our funds.

It was decided to change our Tea procedure by providing free milk. The Tea Committee have more than made good any possible loss by putting small packets of biscuits on sale at lecture teas. Seating comfort has been improved by the new chairs and the provision of four new tables, and this allows more people to be accommodated.

The newly-installed amplifying apparatus has been a great success. Members can look forward to hearing clearly all lecturers who agree to using the new lightweight microphone.

All members will be pleased that Mrs. Boyd Watt has accepted Honorary Membership of the Society. This was offered to mark our great appreciation of all that she has done since 1941

to promote the interests of the Society. In every possible place and at all times she has done her utmost to make the Society, its aims and achievements, known to all. We are most deeply indebted to her.

The Society suffered much disappointment when, through the long-term effects of the postmen's strike, the delivery of the British Association's programmes was so delayed that its members were unable to take advantage of our invitation to visit these premises, with the result that the projected coach trip had to be abandoned at very short notice. This disappointment was particularly felt by Mrs. Boyd Watt who had worked so hard to arrange what should have been a very pleasant occasion.

Fortunately our own activities were all very successful. Members can look back with pleasure on the New Year Party and the Garden Party, and will recall with gratitude the many lectures, excursions and field meetings organized for our pleasure and edification.

Obituaries.

Eva Mary Haines

Mrs. Haines died at Linwood on March 14th, 1964, at the age of 91. She had been a member of this Society for a very long time, and there are many among us who mourn her passing.

In 1898 she and her husband, Dr. F. H. Haines, had moved from Brentford to Winfrith, where their son and three daughters were born. In 1923 Dr. Haines retired from medical practice, and they moved to Linwood, where they established their own small nature reserve, bringing to fruition their lifelong interest in natural history. On many occasions they entertained members of our Society, individually and in parties.

Mrs. Haines joined the Society in 1931, and for 25 years was an active and valued member, regularly attending field meetings until far into her eighties. She enjoyed especially the botanical excursions. Her love of Botany was life-long and she was also keenly interested in Astronomy.

Her great hobby was writing. She contributed to over a hundred periodicals as a free-lance writer, producing informative articles on many subjects, as well as verse and fiction. She was fully and cheerfully occupied with her writing until a few days before she died. She had broadcast more than once, and had frequently given talks on natural history to local groups.

Mrs. Haines supported many humanitarian causes. She was also a great animal lover, always keenly engaged in the conservation of all forms of wild life.

Henry Arthur Hayward

It was with deep regret that members learned of the sudden death of Henry Arthur Hayward at Barton-on-Sea in his 75th year on the 23rd September last. Although geology was his main hobby, he had wide interests, and within a few months prior to his decease conducted botanical outings for the Society in the vicinity of the New Forest.

Mr. Hayward had a distinguished career in the Civil Service, being attached to the War Office, and was made an M.B.E. in 1939. After the Second World War he worked on rehabilitation problems in Germany under the Control Commission, and on the completion of his duties was awarded the O.B.E.

Mr. Hayward joined the Geologists' Association in 1921 and was elected a Fellow of the London Geological Society in 1924. For many years he was secretary of the Publications Committee for the Geologists' Association, and in recognition of his valued services was awarded the Foulerton Award in 1955.

He joined our Society in 1956 and gave several interesting lectures on geological topics. In 1963 he was appointed Hon. Editor of the Society's Proceedings. Immediately prior to this he had made an extended world tour, visiting his only son who was working as a missionary in New Guinea. He visited many tropical and sub-tropical localities, and on his return gave the Society a graphic and interesting account of his many scientific observations.

D.A.W.

Harold Clement Mayo

Some of the most valued members of the Society are often those whose contribution is made quietly from the background. H. C. Mayo served the Society in such a manner for a long period, but he also held high and responsible office from 1951 to 1961.

Mr. Mayo was born in Weymouth in 1888. He began a distinguished career in the General Post Office in his native town. When he retired in 1948 he was the Head Postmaster of the very large district of Romford and Dagenham. It was then that he and Mrs. Mayo came to live in Bournemouth, where they celebrated their Golden Wedding in 1963.

He joined the Society in 1950, and from then on it was a prime interest in his life. He served on the Council from 1951 to 1961 and acted as Auditor for the years 1953-4 and 1954-5, when he was appointed Honorary Treasurer. He held this post from 1955 to 1959 and then acted again as Hon. Auditor until 1961. His colleagues have described how, although at times he was far from well, he was always ready to give assistance and expert advice.

Mr. Mayo died on the 17th of February, 1964, and is survived by his widow, Mrs. S. E. Mayo. We are the poorer for his passing.

Reports of Sections for the year ending September 30th, 1964

Library

The new Card Index is well advanced, and for the books corresponding to the Botany, Geography and Archaeology Sections it is almost complete, thanks to the regular assistance given by several members.

New books added during the year include the following: — *Field Guide to Archaeology* by Eric S. Wood; *Mushrooms and Toadstools* by Lange and Hora; *Birds of Hampshire and the Isle of Wight* by Edwin Cohen; *My First Hundred Years* by Margaret Murray; *Wild Fowl in Britain* by H.M. Nature Conservancy.

H. S. Holbrook.

Museum

It has been another very busy year of alterations, removals and re-arranging of exhibits. All the lantern slides are now in one room under the control of Mr. J. C. Mitton. The House Committee are still engaged in sorting out the very large accumulation of articles contained in many boxes, etc., and also in the delicate work of cleaning the cases of exhibits.

The Museum Committee record their thanks to all those who have given so much care and attention to the Museum.

Wm. L. Whittle.

Garden

The dry summer has not been altogether kind to the garden, where some of the shrubs suffered and the grass took on a rather scorched look. The new hose in the mild autumn has helped to restore freshness, and two loads of good farm manure should give vigorous growth in the Spring. There will also no doubt be an invigorated growth of weeds unless many hands will come to pull them up. There is always need for helpers to weed and hoe and trim and do some of the endless little jobs that make the garden such a pleasure to us all. Tuesday morning is the time for members to meet in the garden, and of course at other times that may be more convenient. The chairman is most grateful to Mrs. V. Goulton and other members for help given during the year.

Winsome Chomé.

Archaeology and History

In a recent archaeology programme on television, the speaker said that Art, Science and Religion formed the basis of all culture. Our 1963-64 programme illustrates this vividly. Many churches have been visited, art treasures of great houses have been studied and enjoyed and the strict discipline of archaeology has been demonstrated in lectures and excursions.

In October Mr. C. H. Stickland lectured on "The Story of the Priory Church at Christchurch" and in November Mr. R. L. P. Jowitt, Hon. Secretary of The Hampshire Field Club, spoke on "Hampshire Churches". An old friend, the well-known authority on local archaeology and pre-history, Mr. J. B. Calkin, M.A., F.S.A., gave an interesting talk on "Bournemouth before the Roman Occupation". Mr. S. E. Whitaker, A.R.I.C.S., produced some unusual views of church interiors to illustrate "Seen from the Triforium".

In February Mr. R. N. Peers, M.A., Curator of Dorset Museum, lectured on "The Iron Age Forts in Dorset". Using his own slides he also described the controversial Dorset Mosaic at Hinton St. Mary. The March lecture by Mr. J. Pallister was on "Excavations in and around Southampton", in which he had played a leading part.

The first Field Excursion in April was to Glastonbury. In perfect weather members were able to study the Abbey ruins and to visit St. John's Church and the Museum with its models of the Lake Village. We also visited Montacute House, where we were told its history and shown its works of art.

In May we went farther afield, calling first at Bradford-on-Avon to see the Saxon Church and the Tithe Barn, and then on to historic 12th century Berkeley Castle, rich in old furniture, silver, paintings and tapestry, and the scene of the murder of Edward II.

The June and July excursions were devoted to visiting our great prehistoric monuments. We went to Silbury Hill, which the more agile of us climbed, before going on to Avebury, where we made the usual processional walk around the great stones, and afterwards to that great sepulchral masterpiece, West Kennet Long Barrow. In July we visited Stonehenge and searched out the dagger and axe markings on the Trilithons. Then to Woodhenge and on to Devizes Museum to examine the objects found in the barrows around Stonehenge and Avebury.

A combined Archaeology and Geography excursion to Cerne Abbas and Milton Abbas in August rounded off a very good season.

A special word of thanks is due to Dr. Wray, who took charge of the Section at the beginning of the Winter Session before the present chairman was appointed. He arranged the first three lectures and took the chair at the meetings.

The Archaeology Room has been thoroughly refurbished and the exhibits rearranged. All the Egyptian exhibits are now in this room; the Stone Age artifacts are in the Curator's Room opposite. We are very grateful to Mr. Shillidy, Mrs. Sephton and Mr. Moss for their assistance while the changes were in progress.

C. Simpson.

Astronomy

The Chairman delivered three lectures during the year. In November he spoke on "A Remarkable Fortnight in the Sun's Recent Life", illustrated by a continuous film covering the solar period of maximum flare activity in 1958. As shown, the film was a combination of those taken at twelve observatories in widely separated longitudes and integrated at Sacramento. The second of these lectures was given in February on the Milky Way, which was treated as the typical spiral galaxy, while the third, delivered in September, described the recent work on single star radiating galaxies "Quasi Radiosa Stella", known as Q.S.R.S.

In October Mr. W. Day, F.R.A.S., spoke on "Pioneers of Astronomy in the 19th Century", from Sir John Herschel, Adams and Leverrier as gravitational astronomers to Bunson, Kirchof, Huggins and Lockyer, founders of astronomical physics.

In January Mr. W. L. Whittle, M.I.M.E., discussed in an impartial manner the rival theories of primaeval and continuous creation, and these two cosmologies were the subject of a brisk debate.

In April Mr. C. Pither gave the section an instructive summary of recent research on Venus, its period of rotation, its atmosphere and the "Venus probe".

In May Mr. G. Marek, A.R.I.C.. of the Southampton Astronomical Society, lectured on the "Evolution and Composition of the Planets". He dealt with the chemical composition and physical properties of the earth's crust, mantle and core, and reviewed current theories of planetary evolution.

W. P. Winter.

Botany

1963-1964 has proved another successful year for the Section, and meetings have been well attended. During the Winter Session we were delighted to welcome once again Mr. O. Polunin, M.A., F.L.S., who came from Charterhouse School to give us another of his interesting accounts of "Plant Hunting", this time in the Eastern Mediterranean.

We also enjoyed lectures by the following: Miss M. R. MacKeith, B.Sc. (a new member) on "Fungi—Friends or Foes"; Professor R. Good, M.A., D.Sc., on "Dorset and some of its Wild Flowers"; Mr. E. Chambers, F.L.S., on "Spices and Man"; the Chairman on "Desert Plants". We sincerely thank all these lecturers.

The Spring and Summer field meetings were varied in character and included several new localities. We thank the leaders for so generously giving their time to the organization of these days which are so much enjoyed by all who attend.

It is with great sorrow that we record the death of Mr. H. A. Hayward who had been such a helpful member of the section both in lecturing and organizing field meetings. He was on his way to join the party at Queen's Bower when he collapsed.

During the past year the library has been completely re-organized, and we owe a debt of gratitude to those who have worked so hard to complete the re-numbering and cataloguing of the botanical books. The Section's Secretary, Mr. M. H. Cocke, is to be congratulated on the wonderful work he has done in classifying and indexing our botanical records.

Plant Records

The following have been reported by members (initials in brackets): —

Leucojum aestivum (Summer Snowflake), Whatton's Ford, River Avon. (V.P.)

Himantoglossum hircinum (Lizard Orchid), Downton, Wilts. (V.P.)

Herminium monorchis (Musk Orchid), Hoopside, Wilts. (V.P.)

Vicia lathyroides, Hengistbury. A re-appearance on an old site. (P.Y.)

Juncus kochii, near Brockenhurst. (P.Y.)

Carex contigua, Hengistbury. (P.Y.)

Psathyrella multipedata, a rare fungus, was reported by Dr. Hora from Grovelly, New Forest. (V.P.)

A. K. Hunt.

Geography

The six lectures and seven excursions organized by this Section were all well supported and members showed keen interest.

Mr. E. Chambers, F.L.S., an always-welcome contributor, spoke on "South America—a continent of contrasts". Another old friend, Mr. H. de Castro, took us back along the byways of Dorset.

Mr. D. T. Adams, M.A., described the geographical features of Burma and Mr. T. E. Wood, M.A., LL.B., gave personal reminiscences of the years he spent there. A colour film gave a vivid impression of the beauty and resources, especially in oil, of this State.

Mrs. G. J. Middleton, who lived for some time on the small isolated Lord Howe Island, 450 miles east of Australia, described its scenery, climate, animal life, crops and tourist industry. Mrs. Nowell of California who had spent several months in the Hawaiian Islands, described these exotic places, using her own transparencies.

The Chairman gave an account of the physical and human geography of Devon in preparation for the four-day excursion in May. The headquarters were at Torcross, and visits were paid to

the Slapton Ley Field Centre, Start Point, Dartmoor, Plymouth, the Bovey Tracey Oligocene basin and the River Dart.

On three different occasions places of local interest were visited: Carter's Tile Works, where over a million tiles are manufactured each week; the Upper Gardens and the Bourne Valley; the Meteorological Station at Hurn Airport and St. Catherine's Hill.

A tour of the chalk valleys of North Dorset, with their picturesque villages such as Cerne Abbas, included a visit to Milton Abbey during its millenium celebrations.

The Nadder Valley, Old Wardour Castle, the National Trust viewpoint at Win Green and the Pitt-Rivers Museum provided much to interest geologists and archaeologists as well as geographers.

A visit to Clark's Shoe Factory at Street covered quite different country in the reclaimed Sedgemoor, where on an "island" are situated the ruins of the delightful Cistercian Abbey of Muchelney.

The Chairman would like to thank the lecturers and all those who have helped to make the year a successful one.

F. M. Exton.

Geology

During the past session we had three interesting lectures on widely varying aspects of geology. On November 2nd, Mr. R. G. W. Brunstrom, M.A., F.G.S., the geologist in charge of investigations for the British Petroleum Company in Dorset, gave us a fascinating account of the various methods adopted in the search for oil under the sea-bed in many parts of the world. It was peculiarly appropriate that this coincided with off-shore explorations then taking place in the English Channel off the Dorset coast near Lulworth, where recent geophysical and seismic tests had suggested a possible underground structure for the occurrence of oil. The lecture was illustrated by films and diagrams.

On November 23rd we had a visit from Mr. A. G. Steavenson, M.A., of Southampton, who gave a detailed account of the evolution of two of our main rivers, the Medina and the Meon. It was based on researches carried out by members of the Hampshire Field Club and illustrated by numerous maps and diagrams.

In February we had a large and appreciative audience for an interesting and instructive description of the "Dinosaur Trackways in the Swanage Quarries" by Dr. A. J. Charig, M.A., F.G.S., who is Curator of the Sections of Fossil Amphibians and Reptiles in the Natural History Museum at South Kensington. This very extensive series of reptilian footprints are in many ways unique and have attracted considerable attention. Among the many remarkable slides illustrating the lecture several had been taken for the lecturer by Mr. D. J. Dudley.

D. A. Wray.

Microscopy

The Microscopy Section has again been fortunate in the lectures given by members of our Society, for they have demonstrated how useful the microscope can be to our other scientific Sections.

In December Mr. W. L. Whittle, M.I.M.E., showed how the geologist needed the microscope to examine the structure of coal. Using the latest micro-colour photography, he illustrated the method of formation of the many products which are derived from coal, and their full utilization.

Mr. E. Chambers, F.L.S., gave a most interesting talk on the use of the microscope in agriculture. He demonstrated how its use had enabled us not only to increase the supply of food but also to improve its characteristics for the benefit of mankind.

The February lecture dealt with Botany. Mrs. A. K. Hunt, B.Sc., used transparencies to illustrate the structure and growth of ferns. Other slides showed the processes of reproduction from spores to thallus and finally to the young fern.

The Chairman's talk was entitled "Crystals under the polarizing microscope". Using colour transparencies, he demonstrated how minute crystals in rock sections could be analysed by means of light interference.

A few members have been using the Society's microscopes and collection of slides. It is hoped that many other members will do the same.

A. J. Aiers.

Photography

Eight lectures were given during the year to good audiences. Mr. T. H. Bickel with Part II of his "Cargo to the Near East" continued the journey which had given us so much pleasure in Part I. Mr. F. Burridge's new lecture on "Percussion in Colour" struck an original note with a clever combination of music and photography, dispensing with the spoken word.

Mr. C. C. Poole, A.R.C.S., showed some of his lovely pictorial slides and explained how he composed them in "Pictorial Photography in Colour". Mr. R. Pearce made a welcome return with "A Feast of Colour".

The New Year commenced with an unusual theme by Mrs. J. Dudley in "Art and the Camera", which showed brilliant examples of her artistry in both spheres. The effect was enhanced by synchronized recorded music.

A lecture by Mr. T. M. Bell, B.A., M.B., B.Ch., is always an event. He described in his own inimitable way "An Andalusian Holiday"

In this year's "Kaleidoscope" four members contributed to an interesting and varied programme: Mr. G. W. Butler, Miss E. M. Habershon, Mr. W. J. Read, M.Sc., F.R.I.C., and Mr. A. C. Withers, F.A.I. There are vacancies in "Kaleidoscope" for more members,

especially those new to lecturing, who have interesting 35 mm. transparencies to show. They are required to speak to their slides for only 15 minutes.

The season closed with Mr. M. I. Mansfield's informative talk on "Historic Dunster Castle", illustrated by his unique set of monochrome slides.

Our thanks are again due to Mr. Holroyd and his panel for their customary efficient projection of slides, and to all the lecturers. It is hoped that by next season a new and modern 35 mm. projector will show just how beautiful a good colour transparency can be.

Ursula Ogle.

Physics and Chemistry

There are at least two facets of scientific research which light up one another, so furnishing not only new and exciting knowledge but also enriching the store of new concepts, out of which great fundamental principles may well grow up, perhaps with unimagined speed and intensity. To cite one example out of many, we are now witnessing new work in cosmology and oceanography which must inevitably attract the physicists already busy on those frontiers and ready with relevant experimental mechanisms and materials of the greatest value for further swift advance.

It is also being appreciated that a capacity and concern for research and original thinking cannot be fostered too early in our young scientists. At Oxford, for instance, the preparation of a research thesis is an essential part of class-grading of science undergraduates, and our Society has been able to gain some impression of the high standard of original work now accomplished by young students of both sexes. Thus, our President brought to our platform Talbot Heath School girls from Slapton Ley Field Biological Unit and the 1963 British Girls' Exploring Society's Expedition, while the present writer arranged with the Poole Grammar School for two old boys, now undergraduates at Oxford, to lecture on topics which they hope to advance by their own research work even before graduation. Mr. A. J. Cleave of Balliol spoke on Chromatography as an aid to his analytical requirements in Biochemistry, and Mr. D. Nunn of Merton dealt with Relativity as a fundamental concept in the new thinking on problems of the control and destiny of the universe. A further intervention, by Canford School boys, will be announced in the course of the 1964-65 session.

A consideration of modern judgments, in so far as they now influence the views held by most physicists and naturalists, was given by the writer in a comparison of the writings of Ernst Haeckel and Oliver Lodge. The recent work on Virology and on the material foundations of life has afforded a useful yardstick of the divergent theoretical standpoints of these two men.

The new "Dragon" reactor of the U.K. Atomic Energy Authority at Winfrith has recently "gone critical", i.e., it is now operating with a self-promoting chain reaction of neutrons. This significant international co-operative venture in the development of nuclear energy for peaceful ends was visited by thirty members of the Society on June 13th. The demand for tickets was so large that a second visit may be arranged.

Herbert E. Clarke.

Zoology

The fortnightly Field Meetings have again been continued throughout the year, with little interference from the weather, and good tidal conditions. In each calendar month there are only two weekdays when the tide is suitable. Consequently, during the Lecture Season, October to April, the arrangement of the Programme dates can be difficult. A wrong state of the tide means the absence of any worthwhile birds. So far this has been avoided, but in recent years a new hazard has been the notable extension of seaside holidays into September and October. When only the occasional human wanders along the edge of the tide, then the birds do not!

The attendance at Meetings naturally varies, but in the year under review the number of members present has always made the Meeting very well worth while, and this applies to Winter as well as Spring. In fact, even after making due allowance for the 1962-63 winter of snow and frost, the average attendance for this year is nearly thirty per cent. higher.

On one of the Club Days the writer gave, with comments, a selection of recordings of the calls and songs of some British birds. Those heard annually formed the majority, but a few of the less common were included. From the number of members present and their response it appeared to be appreciated and useful.

The most important ornithological topic of the year has undoubtedly been the serious effects of seed dressings and other horticultural chemicals used on farms, and to a much lesser extent in gardens. The proved results are growing mortality and infertility, and the rarer species are affected. Increased and economical food production is essential. So also is the maintenance of the balance of nature.

The sight of a really rare wild bird is usually the accidental reward of an individual watcher while just strolling or sitting—and staring. An exciting moment, but rarely a prolonged one, except in the mind. Club and Group Field Meeting members find their pleasure among the enormous variety of somewhat less rare birds, often present for a season only. They admire their plumage and enjoy their songs. They watch them moving so naturally and efficiently in their daily routine of feeding and nesting. They see them search the vegetation; make sudden aerial sallies from a

chosen post; hover and stoop to carry off small prey. Near the water's edge they watch them wade and probe the tidal mud for food, while flocks of hundreds rise, swerve and turn as one. Others are seen issuing suddenly from the cliff nesting ledges, disappearing out to sea just above the water, and soon returning with food.

These are a few of the abiding pleasures of the watching members.

They also brave bitter winds and risk getting wet.

But we have also seen Spoonbill, Red-throated Diver, Smew, Phalarope, Osprey, Storm Petrel, Black Tern, Stone Curlew, Corn Bunting and Corn Crake.

H. V. Harris.

Cine Film Subscription Programmes

Members have again shown their interest in these programmes of films by the large attendances, ranging from 100 to 160, many paying the full Season Subscription. This reflects the high quality of films that it is now possible to hire.

The aim of the Chairman is always to secure films of artistic value which also make a definite contribution to knowledge, and illustrate the work of as many Sections as possible. During the year under review six programmes were given showing a total of 25 films, nearly all of them in colour. Suggestions for topics, from Heads of Sections and indeed from any members, are always welcome, and the Chairman is always glad to learn of new films or new sources of films.

Our thanks are due to the projectionists, Mr. D. J. Dudley and Mrs. J. Sewell, for their unfailing and highly efficient service to the programmes.

J. H. Bailey.

Club Days

Attendances at the monthly meetings varied from 20 to 60.

In January Mrs. W. Boyd Watt, F.Z.S., M.B.O.U., Miss E. M. Whitaker, Rev. G. S. Reakes, B.A., Mr. W. Moore and Mr. G. Holroyd reported on the Aberdeen meeting of the British Association for the Advancement of Science, and Mr. Holroyd showed a film (taken by the Scottish Region Television unit) of an interview with these representatives of the Society. In May Miss F. M. Exton, B.A., outlined the proposed Geographical Excursions in 1964, drawing attention to the special geographical features to be studied. In June, Mr. and Mrs. H. V. Harris gave a talk on Bird Songs, illustrated by a wealth of gramophone recordings. In August Mr. A. J. Aiers, A.I.Mech.E., lectured on Conchology, with special

reference to the Society's collections of shells, and showed numerous colour slides which he had made of these.

Other subjects discussed and illustrated during the session were: Alpine Flowers—Mr. H. A. Hayward, O.B.E., F.G.S. and others; Spring Flowers—Mrs. A. K. Hunt, B.Sc. and others; Christmas Customs; Autumn Observations; Natural History Questions; Exhibits from the Museum.

On September 9th, 30 members attended to make a tour of the Building and Exhibits, when Chairmen of Sections demonstrated Exhibits in their respective Sections.

The Chairmen of Sections always welcome suggestions and advice from members on the best use to be made of Club Day meetings. The writer wishes to thank all those who have assisted during the session.

Wm. L. Whittle.

Presidential Address

Nonconformity in Nature

by DAME KATHLEEN LONSDALE, D.B.E., D.Sc., F.R.S.

(*Delivered before the Society on the 3rd October, 1964*)

Mr. Chairman, ladies and gentlemen. I want to say thank you very much, first of all, for the honour you have done me in asking me to be President for this year, and for your very kind welcome. I know that certainly in one way I cannot take Miss Exton's place: she lives among you. I can only claim to have very strong personal ties with Bournemouth and to say that I am very fond of Bournemouth.

I have chosen as my title this afternoon, "NONCONFORMITY IN NATURE". Anyone who is a teacher of science has some moral problems. Scientific laws are simple to explain if you are not too honest. If you have to teach your students about Newton's laws of motion, for example, you can make them sound very simple by leaving out what applies to the very small—the internal structure of the atom; or to what is very large—the galaxies. But to all these very simple laws there are exceptions and the problem always is how soon to introduce students to these exceptions. If you do it too soon they become confused; if, on the other hand, you are too dogmatic and if you make everything seem very simple, then you do in fact confuse students in another way because they don't develop their powers of criticism and they tend to believe, as too many people already believe, that science is something very exact and very precise, something orderly about which scholars agree all over the world whether they are British or Americans, Russians, Chinese, or Japanese. They forget that there are such things as scientific controversies and that some scientists remain lone wolves all their lives, pushing theories that nobody else will accept. I have known of at least two Nobel Prize-winners who after a lifetime of scientific work have come to believe in theories which no-one else could confirm and no-one else would accept, and who never gave them up.

But I am not talking this afternoon about scientists who are nonconformists, but about nonconformity in nature. Nature's curiosities are the first form of nonconformity that I want to discuss, and as I am not a biologist I hope you will excuse me for talking for a while out of my own field; but I must do that in order to make my subject complete.

There are, I believe, several million different species of plants and animals, and generally speaking one can distinguish between the two. My first illustration (taken from a postcard from the Science Museum, London) shows a blue whale which when adult is about 100-ft. long and weighs as many tons. That is about the

biggest animal that I know. At the other end of the scale you have "animals" so small that they need an electron microscope to show them up.

There are other animals, like the duck-billed platypus which nearly became extinct, which are so queer that they stand out as curiosities. Nature has buried many of her strangest experiments. The next two slides show the Diplodocus and the Pterodactylus. These were animals which could not change when conditions changed in the world. It was those who could change that survived. One might almost say that the conservative died out: it was the nonconformist that was able to last.

In general one can classify organisms as either plant or animal. The next slide shows a very typical plant, the wild carrot, which in America is known as Queen Anne's Lace. The plant illustrated is in fact a rather strange example because this flower which is complete and normal in every particular, even to the tiny red efflorescence at the centre, was grown from a single cell dissected from seed. It was shown as an illustration in the American scientific journal "Science".

Now plants as a rule have cellulose cell walls. They have no powers of locomotion. They manufacture their own food from inorganic materials with the help of sunlight. They draw their nourishment from water and the soil, and they lack the sensitivity of animals.

My next slide shows an extremely sensitive animal. It is a male silkworm moth, which can detect the scent of its female over a distance of up to two miles, and it does so by means of its extraordinary antennae, which can pick up even one or two molecules of the sex attractant that the female emits.

There are quite a number of solids—quite apart from insects —that give off molecules. Camphor is one of them. I am rather proud of this exhibit because it is a garland that was given me a year or two ago by the late Mr. Nehru, on the occasion of the Indian Science Congress at Cuttack. It was one that had originally been given to him. As his car went along the country roads in India, all the children used to line the roads and give him garlands. Some of the garlands were of flowers but some were of camphor and the reason was that they were not a nuisance to the recipient, because whereas flowers fade and die, camphor simply disappears. Camphor is giving off molecules all the time and particularly in a hot country the little camphor balls would evaporate so that soon there would be nothing left except a little bit of fluff and wire which could be thrown away. We used camphor before we got paradichlorbenzene to keep away the moths from our clothes cupboards.

But the reason why camphor gives off molecules is that the molecules in camphor are vibrating much more strongly than they are in most solids, so strongly that it is very easy for them to

break away from the surface and to go into the surrounding atmosphere. Now in a sense that is analogous with what is happening in the case of the female silkworm moth, except that in her case, and that of many other female insects, you get these molecules deliberately thrown off so that the sensitive male can detect them.

I want to show in my next slide one or two of the kinds of molecules that have a camphor-like scent. You notice that they have very different types of formulae, yet they all have a camphorous smell just like the balls in my garland. The reason is believed to be that although they have very different formulae they have much the same sort of *shape* and that it is shape much more than the chemical formula that decides the actual scent. There are half-a-dozen basic scents and one can mix them of course; but the camphorous scent is found where the molecule itself has a circular bowl-shaped outline which enables it to settle into a receptacle in the nose that just fits that particular size and shape of molecule.

Now we have discussed plants and animals, but Nature does not like sharp boundaries. Consider a virus. Most people do not realise that some viruses are crystals. This slide shows a polio crystal. It is a beautiful little crystal, whose molecules, which of course are rather big, are arranged in a very regular way. The picture shows what they look like in an electron microscope where you can really "see" the individual molecules, and this is a model showing that they are arranged very much as any housewife would arrange tarts on a tin to go into the oven, in the most close-packed way possible. But this is a virus which *grows!* One might think of it as an animal, a plant or a mineral—one of those queer creatures that cannot really be properly defined.

And what about toadstools and mushrooms? They don't get their food from the soil; they grow on decaying vegetable and animal matter. Then there are the sensitive plants, the sundews and the pitcher plants. Even more curious are the slime fungi, which live on damp earth and decaying vegetation and consist of naked masses of protoplasm which have no cell walls, and which creep slowly over the surface and feed by engulfing solid particles, and then suddenly change their nature: cell walls appear and they form spores or fruit. They are neither plant nor animal: they are in a sense both in turn.

Some other creatures don't change their nature as the slime fungus does. They do change their habits. They are no longer confined to their previous patterns of behaviour. When I was young you never saw a seagull inland. Seagulls confined themselves almost entirely to the coast. But in order to survive when the coast and coastal waters became contaminated with oil, seagulls spread pretty well all over England.

The nesting of starlings in big cities is quite a new thing. There used not to be the big cities for them to nest in. In that case the nonconformists—the few who came into the city to nest

—have become the normal. Now, except in wooded country, you find green woodpeckers feeding much more often on the lawn than on trees; and there are other changes of habit which relate to migration of birds or animals.

Of course migration as such is normal for many species. I live in a house where year after year swifts come back at the beginning of May or very occasionally on the last day of April, and leave again in the middle of August. But there are occasionally abnormal migrations when birds of a particular kind appear in new areas that they have not visited before. We also hear reports of mass migrations of land animals as a result presumably of population pressure. It is very difficult to get really definite evidence of these but there are pretty good records now of whole colonies of lemmings which have marched towards and ultimately right into the sea and committed mass suicide. The same thing is reported of springboks. Sometimes they move out towards the coast and then right into the sea. And it is difficult to avoid the conclusion that this is in a sense a kind of mass hysteria.

Mass hysteria is something which is not confined to animals. It can occur in human crowds and it is not a very pretty thing when it does occur, whether it involves teenagers and pop musicians, or segregationists bent on a lynching. There is another form of infectious hysteria. I have seen this from time to time in prisons and in Borstal institutions where the inmates—I do not much like the term but it is the official one—one after another smash up their cells or slash themselves with pieces of glass they have obtained by breaking a window; or set fire to their bedding. The only known cure is to isolate them quickly under conditions where they cannot harm themselves or anybody else.

Of course all forms of disease and deformity can be classed as nonconformity either with the normal of a species or with its ideal. I have been working recently on a fascinating subject, the composition and structure of bladder stones. Many of these stones are like large pebbles. The extraordinary thing is that in the countries where these are particularly prevalent (for example, in India, Indonesia and Thailand) they are mostly, 95% of them, from boys from 6 months to five years old. In fact, in the hospital in Thailand from which I got one of my collections, over one-third of the children under five who come into the hospital at all come in for removal of stones; yet we do not really yet know what it is that causes these, why they go on growing and why they stop. After they are removed, these small children are usually quite cured and don't get them again. They used to be prevalent in Britain, particularly in Norfolk 150 or 100 years ago, so much so that they built a special hospital, St. Peter's Hospital, just for these cases. They have died out now here, so that this particular kind of endemic bladder stone is rarely seen. There are other parts of the world where they are increasing and other parts where

they are decreasing, and as yet nobody knows why. In my next slide I have an example to show what one of these stones looks like when it is cut across—whole concentric layers of different kinds of minerals. It is about 4 cm. across, and I have quite a number that are about that size or larger. These bladder stones are nonconformists.

But when I talk about the normal, the normal itself is of course a fiction. We say that the normal body temperature is 98.4, but a lot of people generally have a low temperature, say 97.6. Other people, particularly children, habitually run a high temperature: 98.4 is just an average.

Physical characteristics are handed on from generation to generation so that strains and breeds and races and species do, generally speaking, breed true. But there is regrouping of the hereditary material at every new birth so that no two individuals are ever exactly alike, whether they are spiders or elephants or sweet peas or mushrooms or men. Even identical twins are never absolutely identical. I have met some of them that are left- and right-handed: mirror-image twins.

Although generally speaking there is a handing on of characteristics from generation to generation, yet there are also variations which accumulate: on the whole we are considerably taller than our ancestors of the Middle Ages, most of whom would be perhaps my size or a little less (I am rather small). Occasionally, however, there is a change which is both sudden and drastic, a mutation. It is nearly 80 years since a Dutch botanist found primroses in a field near Amsterdam which were quite unlike the normal evening primroses: one of the first examples of a mutation. Sometimes a mutation in a plant or an animal produces a new and much better variety from which you can breed. The Morgan horse—a foal which was stronger, more powerful in its neck and in its body, more speedy, and which gave rise to the carriage horse of America—is one such example.

But often mutations are bad. One very famous example was that of Edward Lambert, born in the early 18th century, who was said to be covered from head to foot with overlapping black scales, so that he rustled when he walked. He had six children and one grandchild all like himself; then the strain died out because they could not find mates. One could not wonder at it. And there have been other bad mutations which died out. Most mutations which are caused by radiation are lethal although some produce abnormalities. Usually they are rather unpleasant ones, and one hopes that they may die out if the abnormality is a very gross one. Meanwhile there are such children and we tend to shut them away with the thalidomide babies.

And yet I sometimes wonder. There is a good deal of breeding going on to-day, but if we could breed human characteristics at will, as we now breed cattle for good beef or a good output of milk, what would we breed for? Not the normal I take it, because

we already have too many of those. Would we breed for brain or for brawn or for both together? If we had both together, that might be rather frightening unless we could be sure of gentleness and goodness too. And what about beauty and artistic ability? I must say that if ever the pressure of population brings us to the point of selecting our parents as we now select our scholarship- and grant-holders, I hope they don't ask me to serve on the Selection Committee. I don't know anyone who would be wise enough to do so.

But what is more staggering still is the fact that a very small amount of a chemical substance can sometimes interfere in such a curious way, sometimes a tragic way, with the development of normal embryos. We all know of the thalidomide tragedies. Indeed all deviations from normal conditions seem to be due to small and almost insignificant chemical changes in the body. Sickle-cell anaemia, a vital scourge in some populations, is associated with an abnormality in just one component of the haemoglobin of the affected body.

I have a model here of a molecule of decamethonium. This is a chemical that behaves rather like curare. Quite a small amount of it can produce a complete paralysis of the muscles.

It has also been found by experiment that if the diet of a female pigeon is deficient in the metal manganese it causes the bird to lose her mother instinct completely. She won't feed her young but smothers them.

These sorts of facts have implications in the treatment of criminal behaviour. I visit a girls' Borstal institution regularly and I see there a considerable number of young delinquents, a few of whom are quite clearly young psychopaths. It is not the right place for them: they don't fit in. It may be that in some way their bodies have a small deficiency or excess of certain components as compared with the normal. Most of the girls we have are 16 to 21 or 22 and they are very naughty. Some of them have been neglected: many of them are unfortunate; they need re-educating and many of them respond to education. But there are some girls who do not fit in at all. They are irrationally violent. There is a strong element in them of mental instability. Many of them are not at all unintelligent, and although they may be mentally unstable they are not certifiable; but they are morally untrainable as far as the methods that we know can be used. Neither Borstal institutions nor prisons are the right place for them. Mental hospitals of course won't have them because they are not certifiable and they have criminal tendencies. What they do need is special treatment, including a great deal of research, and they are not getting it.

Let me come now to my own scientific field. Small traces of special elements can be responsible for very remarkable properties in different kinds of solids. Small traces of elements present as trace impurities in crystalline materials can give colour lumin-

escence, semi-conductivity, all sorts of properties which are very valuable both in industry and in research.

I am going to talk for a while now about Crystallography and about the way which even in Crystallography we have nonconformists. I showed earlier a slide of the polio virus, which is itself a crystal. Coming to another kind of crystal which perhaps we know much better, the next slide shows a collection of natural diamonds: you will see that there are all sorts of shapes. Here is an almost circular one which looks more like a pearl, but it is in fact a diamond. Some are black diamonds known often as bort. Here is an almost perfect octahedron, and here is a very flat triangular shape. All these diamonds have the same pattern of atoms inside. They are made of nothing but carbon, and they are made of carbon atoms arranged in a very regular pattern, so that each carbon atom is equally surrounded by four other carbon atoms. It does not matter what the outside shape is, the internal arrangement is a regular one. When we think of crystals we very often think of something which has a beautiful outside shape—crystals often have. But really what defines a crystal is the regular internal structure which has a repeating pattern, characteristic of each substance; and all true solids are crystalline. The next slide shows two different kinds of carbon: the one on the left is the arrangement of the carbon atoms in the diamond; I have a little model of it on the table. On the right-hand side you see the arrangement of the carbon atoms in graphite in hexagonal sheets well separated by big distances: this substance has quite different properties from diamond although both are just carbon. The diamond is very hard; graphite is soft. Graphite is of course the "lead" in a soft lead pencil. Diamond is usually transparent; graphite is black. Diamond has a high insulation for electricity; graphite is conducting. In fact this layering of the carbon atoms in sheets is responsible for many of the properties of graphite.

I remember when my elder daughter was quite small she was very fond of drawing, and I said to her one day, "What are you drawing, Jane?" She said, "I am drawing a man." She showed me the piece of paper, but I said, "You haven't put him on any legs yet." She said, "Well, they are still on the pencil." They were still on the pencil: she was quite right! What she was doing was transferring sheets of carbon atoms from the pencil on to the paper.

The point about the study of crystallography is that the arrangement as well as the nature of the atoms in a solid is responsible for its properties. We study these arrangements and we find out what the atomic patterns are, and when we teach crystallography we teach the students about these patterns, perfectly regular and orderly and with no kind of mistakes in them. Actually they are not really like that at all!

The next slide, which shows a crystal of quartz, illustrates another point, which is that in a crystal the properties may be very

different in different directions. Quartz is a crystal from which one can cut little plates and discs. The properties of these plates and discs, which are used in electronic apparatus, are very different according to the direction in which they are cut.

We have been studying these crystal arrangements for about 50 years now—I came into it about 40 years ago—and we use x-rays. X-rays are one of the most nonconformist of all the radiations which we have. X-rays were discovered, as you remember, by Röntgen. Röntgen found them really by accident; but although it was an accident he was a sufficiently good physicist to recognise that something strange was happening. He found that a sheet of paper covered with barium platinocyanide was fluorescing although apparently there was no light falling on it at all. He found that the effect must be due to a tube with which he was experimenting at the time, and that it must be coming from some kind of invisible rays which could pass through the glass of the tube and fall on the barium platinocyanide, which then gave off a visible radiation. Some other compounds which have a minute trace of impurity in them also become luminescent under the action either of light or of x-rays. These x-rays captured the public interest because they were able to pass through all sorts of things and yet they could leave shadows behind them because some components were more opaque to x-rays than others. This is a photograph of a little insect taken by very soft rays which are stopped by the more absorbent part of the insect's body.

Fifty-two years ago a German physicist, Professor von Laue, who died only two or three years ago, discovered that if he put a crystal in a beam of x-rays there appeared, on a photographic plate or film placed behind the crystal or surrounding the crystal, a pattern of spots or lines. Some of these patterns are very beautiful. Here is the pattern that is given by a single crystal of the mineral beryl. Here is another set of patterns that is given by different kinds of powdered aluminium oxide. These so-called "powder patterns" are often used for identification because each kind of powder gives its own unique pattern. We sometimes call it the fingerprint method.

Another kind of x-ray pattern, given by a crystal of haemoglobin, is shown on the next slide: this is one of those that won a Nobel Prize recently for the Cambridge physicist, Dr. Max Perutz.

Here is another pattern, given by decamethonium iodide which I mentioned before as paralysing the muscles in the way that curare does. In each of these pictures there are spots and streaks. What we actually do is to measure the positions of these; then we measure their intensities; and using a high speed computer and a certain amount of intelligence and common sense, we can work back to the regular, periodic arrangement of atoms or molecules within the solid that is responsible for that particular pattern.

If you have an irregular arrangement of atoms of the kind that occurs in a glass then there is no pattern of streaks or spots on the x-ray photograph at all; there is just a hazy ring. You get the same kind of ring from a piece of unstretched rubber, where there is no regularity. But if the rubber is stretched, then there is a certain amount of irregularity remaining but a spot pattern appears, showing that the stretched rubber is in fact almost a kind of crystal. The unstretched rubber is more like a glass or a liquid in its internal structure.

One of the most nonconformist among solids is ice. Ice is a very common thing; we see it of course in the form of snowflakes and we see it on the surface of lakes, and yet it is really a most unusual solid. When it melts it contracts and when it freezes it expands. Most solids do exactly the opposite. The result is that our water pipes burst and gravel roads frost-heave in a hard winter. Yet if ice did not contract on melting, if it did not expand on solidification, life would be quite impossible except in the tropics. Ice is less dense than water and therefore it floats on the surface of a lake. If it were more dense than water it would sink to the bottom. It would sink to the bottom of the seas and the rivers and more and more ice would form, until the whole of the sea apart from the tropics and the whole of the rivers and lakes would be solid. They would never unfreeze even in the summer. Fish and other aquatic forms of life would be impossible. Burst pipes and frost-heaving are a small price to pay for having water most of the year round.

Another curious thing about ice is that although it is a perfectly good solid yet when it occurs in the form of a glacier it flows slowly like a viscous liquid. Another interesting thing is that ice is responsible for the generation of lightning. I want to say a little bit more about that later on. The arrangement of the atoms in ordinary ice is in layers. Each layer is an hexagonal arrangement of water molecules H_2O.

There is another kind of ice: it is a very special, a nonconformist form. It can only be formed under special conditions. If water vapour is deposited quickly at a very low temperature a cubic form of ice sometimes occurs which is different from normal hexagonal ice and which does not have the same properties. In a sense it is almost like the difference between diamond and graphite. It is the ordinary form, the hexagonal form, which gives the phenomena that we know about.

Now for the explanation of lightning. In a very big thundercloud there are nearly always hailstones; they can be as much as $\frac{1}{2}$ cm. across and they would be falling slowly. They are composed of concentric layers of ordinary ice. At the same time in the cloud there are tiny droplets of water super-cooled below the normal freezing point, and not frozen. You can cool water down well below the freezing point particularly if it is pure. But when the supercooled droplets come into contact with a hailstone they

freeze on to it at once and in freezing they give up a certain amount of latent heat. The hailstone must be at the ambient temperature (say —12° C) on the outside but in the middle it is warmer (say —5° C) and thus there is a gradient of temperature. A gradient of temperature causes the vibrating atoms to move asymmetrically and faster; and because the positively-charged protons tend to move faster than the negatively-charged hydroxyl ions, the outside of the hailstone becomes positively charged.

Each falling hailstone now has a positive charge on the outside and the surface becomes unstable; tiny fragments of ice carrying the positive charge break off (this has been repeated in the laboratory on a quantitative scale) and these tiny positively-charged ice particles are carried upwards, leaving the heavy negatively-charged hailstones moving downwards. A big thundercloud can of course be half a mile or even one mile from top to bottom, and quite a big positive charge accumulates up in the top part of the cloud, a negative charge accumulating at the bottom or on the ground, and after a time there is a discharge which is the lightning flash: it is all due to the fact that the molecules vibrate rapidly and that the hydrogen migrates faster than the hydroxyl groups. It is due also to the fact that water, unlike many other things, can super-cool and remain water well below freezing point and then freeze suddenly on to the passing hailstone. Professor B. J. Mason of Imperial College worked out the whole of this theory.

Now let us consider another phenomenon. When an alloy is formed of two different metals, sometimes the two different kinds of element separate out into a regular arrangement in three directions: say, iron nickel iron nickel . . . and so on right through the alloy. If the alloy is cooled very fast the atoms don't have time to sort themselves out, and there is formed a sort of mixture of the atoms so that each of the crystal positions is occupied either by an iron atom or by a nickel atom quite randomly. But if it is cooled slowly then they sort themselves out into an "ordered" pattern.

Very often in this kind of arrangement there is the possibility of diffusion of one kind of atom into another position. There are other sorts of arrangements where there is a regular arrangement of one kind of atom, say oxygen, but the positions between the oxygens are randomly occupied by two different kinds of atoms, lithium and iron in the case of lithium ferrite, $LiFeO_2$. From mixtures of materials of this kind you can make alloys with very peculiar qualities.

What happens when you actually put two metals in contact? There is a very old Christmas game in which you have a kind of composite card made up of movable numbers. You have to sort out the numbers by pushing them around until you get them into a particular order. You can arrange them 1, 2, 3, 4, 5, 6, 7, 8 or you can arrange them 1, 3, 5, 7, 2, 4, 6, 8 and so on, but you could

not push them around at all unless you had a vacant space somewhere. If the whole thing were blocked up then it would be absolutely rigid.

It is an interesting fact that if gold and lead are placed in close contact, the gold and the lead can diffuse into one another. If heated up, not to the melting point but only near to the melting point of lead, they will diffuse into one another as fast as salt diffuses into water. The reason is that although in a solid metal you generally speaking have a regular arrangement, yet in fact there are always holes and blemishes present, so that it is possible for an atom of one kind to pass into a hole, leaving another hole behind it. Thus by shifting one atom up here and another along there it is possible for atoms to move from one crystal position into another. If crystals were quite perfect this could not happen; but because they are not perfect, because they don't conform to the ideal arrangement, there is the possibility of diffusion of one metal into another metal. Different kinds of alloys and different kinds of materials can be made, but if special properties are required they will depend upon this phenomenon of "imperfection" in the structure.

The final slide shows some of the external arrangements of atoms than can occur if different kinds of compounds and different proportions of them are sintered together. These crystalline solids are all magnetic, but their magnetic properties change when they are warmed, partly perhaps because of diffusion of the various metals in them. I have one such magnet here, which if suspended would normally point North and South. When it is heated to 38°C it reverses its polarity, turns round and points South and North. Most ordinary magnets would not do so; this one is a nonconformist!

BRITISH MUSEUM
10 FEB 1965
NATURAL HISTORY